

Managing Concussions in the Office

Kristi Ray, MD, CAQSM
Premier Pediatrics
Team Physician – 27J High Schools
June 12, 2015

Disclosures

I have no financial interests, arrangements or affiliations to disclose.

Objectives

- Review how to evaluate a concussed patient
- Learn about the role of rest in concussed patients
- Discuss return to academics and sport
- Review when to refer

Why?

- 118 physicians (Family Medicine, Emergency Medicine, Pediatrics) surveyed Spring 2012
 - 13% of physicians reported “rarely” or “never” advising cognitive rest following concussion
- Legal obligations – state specific
- Much we do not know about long term effects
 - NFL – suicides, depression, memory issues
 - Youth – unknown long term effects
 - Mood disorders – chicken or egg

New Mexico Law- Senate Bill

1

- Written into Public School Code
- Provision for educating coaches
- NO Same day return to play
- Return to participation only after athlete "...receives a medical release from a licensed health care professional"

New Mexico Law

- “Health care professional”
 - Includes mid-levels
 - No stipulation that professional be trained or educated
 - Any provider may be asked to clear athletes
 - Mandated for school athletes only

Evaluation - History

- Common Signs
 - Somatic
 - Headache
 - Dizziness/Disequilibrium
 - Nausea
 - Sleep
 - Emotional
 - Cognitive

Evaluation - Physical

- Most exams are normal
- Comprehensive Exam should include:
 - Neurologic exam
 - Assessment of mental status
 - Cognitive functioning evaluation
 - Gait and balance testing

Evaluation - Physical

- Common findings
 - Neurological exam: nystagmus, saccadic eye movement
 - Mental status: flattened affect, down/depressed mood, “personality” changes
 - Cognitive functioning: slowed processing speed, difficulty with concentration
 - Gait and balance: off-balance, difficulty with single leg stance
 - Postural stability deficits last up to 72 hours

Evaluation - Tools

- Concussion Assessment
 - Standardized Assessment of Concussion – sideline and office
 - Sport Concussion Assessment Tool 3 (SCAT3) – sidelines and training rooms
 - Acute Concussion Evaluation – initial evaluation
 - King Devick Test – evaluate for saccadic eye movements
 - Clinical Reaction time – specialized equipment, baseline necessary
- Balance Assessment
 - Balance Error Scoring System (BESS) – immediate balance testing
 - Sensory Organization Test – track recovery

Evaluation – Tools

- Symptom Scales
 - Acute Concussion Evaluation (ACE) – clinical form use to evaluate for concussion
 - Concussion Symptom Inventory – track recovery
 - Graded Symptom Checklist and Graded Symptom Scale – track recovery
 - Health and Behavior Inventory – parent and child self-report forms, 8-15 years
 - Post-Concussion Symptom Inventory – age specific self-report forms
 - Post-Concussion Symptom Scale – track recovery

Standardized Assessment of Concussion

- Orientation
- Immediate memory
- Concentration
- Delayed recall
- Balance

ORIENTATION

Score: ____ / 5

- What month is it? 0 1
- What is the date? 0 1
- What day of the week is it? 0 1
- What year is it? 0 1
- What time of day is it? (*w/in 1 hour*) 0 1

IMMEDIATE MEMORY

Score: ____ / 15

Form A

Elbow
Apple
Carpet
Saddle
Bubble

Form B

Candle
Paper
Sugar
Sandwich
Wagon

Form C

Baby
Monkey
Perfume
Sunset
Iron

Form D

Monkey
Penny
Blanket
Lemon
Insect

Trial 1**Trail 2****Trail 3**

	0	1		0	1		0	1	
Word 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Word 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Word 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Word 4	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Word 5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

NEUROLOGIC SCREENINGLoss of Consciousness: (*occurrence, duration*)

Retrograde Amnesia

Antegrade Amnesia

Strength

Sensation

Coordination

CONCENTRATION: Digits Backwards

Score: ____ / 5

Form A

4-9-3	6-2-9	0	<input type="checkbox"/>	1	<input type="checkbox"/>
3-8-1-4	3-2-7-9	0	<input type="checkbox"/>	1	<input type="checkbox"/>
6-2-9-7-1	1-5-2-8-5	0	<input type="checkbox"/>	1	<input type="checkbox"/>
7-1-8-4-6-2	5-3-9-1-4-8	0	<input type="checkbox"/>	1	<input type="checkbox"/>

Form B

5-2-6	4-1-5	0	<input type="checkbox"/>	1	<input type="checkbox"/>
1-7-9-5	4-9-6-8	0	<input type="checkbox"/>	1	<input type="checkbox"/>
4-8-5-2-7	6-1-8-4-3	0	<input type="checkbox"/>	1	<input type="checkbox"/>
8-3-1-9-6-4	7-2-4-8-6-5	0	<input type="checkbox"/>	1	<input type="checkbox"/>

Form C

1-4-2	6-5-8	0	<input type="checkbox"/>	1	<input type="checkbox"/>
1-8-3-1	3-4-8-1	0	<input type="checkbox"/>	1	<input type="checkbox"/>
4-9-1-5-3	6-8-2-5-1	0	<input type="checkbox"/>	1	<input type="checkbox"/>
3-7-6-5-1-9	9-2-6-5-1-4	0	<input type="checkbox"/>	1	<input type="checkbox"/>

Months in Reverse Order

Dec_Nov_Oct_Sept_Aug_Jul_Jun_May_Apr_Mar_Feb_Jan
0 1

DELAYED RECALL

Score: ____ / 5

Word 1	0	<input type="checkbox"/>	1	<input type="checkbox"/>
Word 2	0	<input type="checkbox"/>	1	<input type="checkbox"/>
Word 3	0	<input type="checkbox"/>	1	<input type="checkbox"/>
Word 4	0	<input type="checkbox"/>	1	<input type="checkbox"/>
Word 5	0	<input type="checkbox"/>	1	<input type="checkbox"/>

SCORE TOTALS

Orientation = ____ / 5

Immediate Memory = ____ / 15

Concentration = ____ / 5

Delayed Recall = ____ / 5

Overall Score**/ 30**

ACUTE CONCUSSION EVALUATION (ACE) PHYSICIAN/CLINICIAN OFFICE VERSION

Gerard Gioia, 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 any more than usual today or in the past day?
Indicate presence of each symptom (0=No, 1=Yes). **Love & Collins, 1998 JHTP*

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 ___Yes ___No ___N/A Cognitive Activity ___Yes ___No ___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) _____			

C. Risk Factors for Protracted Recovery (check all that apply)

Concussion History? Y ___ N ___			Headache History? Y ___ N ___			Developmental History	Psychiatric History
Previous # 1 2 3 4 5 6+	✓		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	Other psychiatric disorder

List other comorbid medical disorders or medication usage (e.g., hypothyroid, seizures) _____

D. RED FLAGS for acute emergency management: Refer to the emergency department with sudden onset 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

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: _____ © Copyright G. Gioia & M. Collins, 2006

This form is part of the "Head Up: Brain Injury in Your Practice" tool kit developed by the Centers for Disease Control and Prevention (CDC).

Concussion Symptom Inventory (CSI)
 Randolph, Millis, Barr, McCrea, Guskiewicz, & Kelly (2008)

Player Name: _____
 Date of Injury: _____ Date of Exam: _____

	<i>absent</i>	<i>mild</i>	<i>moderate</i>	<i>severe</i>	Score
	0	1 2	3 4	5 6	
Headache					
Nausea					
Balance Problems/Dizziness					
Fatigue					
Drowsiness					
Feeling like "in a fog"					
Difficulty concentrating					
Difficulty remembering					
Sensitivity to light					
Sensitivity to noise					
Blurred vision					
Feeling slowed down					
TOTAL:					
Other symptoms evident since injury?:					

Graded Symptom Checklist (GSC)					
Symptom	Time of injury	2-3 Hours postinjury	24 Hours postinjury	48 Hours postinjury	72 Hours postinjury
Blurred vision					
Dizziness					
Drowsiness					
Excess sleep					
Easily distracted					
Fatigue					
Feel "in a fog"					
Feel "slowed down"					
Headache					
Inappropriate emotions					
Irritability					
Loss of consciousness					
Loss of orientation					
Memory problems					
Nausea					
Nervousness					
Personality change					
Poor balance/ coordination					
Poor concentration					
Ringing in ears					
Sadness					
Seeing stars					
Sensitivity to light					
Sensitivity to noise					
Sleep disturbance					
Vacant stare/glassy eyed					
Vomiting					
NOTE: The GSC should be used not only for the initial evaluation but for each subsequent follow-up assessment until all signs and symptoms have cleared at rest and during physical exertion. In lieu of simply checking each symptom present, the [certified athletic trainer] ATC can ask the athlete to grade or score the severity of the symptom on a scale of 0-6, where 0=not present, 1=mild, 3=moderate, and 6=most severe.					

Post-Concussion Symptom Scale

Player's Name: _____ Team: _____ Position: _____													
SYMPTOM	RATING			BASELINE	TESTING 2	TESTING 3	TESTING 4	TESTING 5					
	None	Mod.	Severe	Date:	Date:	Date:	Date:	Date:					
Headache	0	1	2	3	4	5	6						
Nausea	0	1	2	3	4	5	6						
Vomiting	0	1	2	3	4	5	6						
Balance problems	0	1	2	3	4	5	6						
Dizziness	0	1	2	3	4	5	6						
Fatigue	0	1	2	3	4	5	6						
Trouble falling asleep	0	1	2	3	4	5	6						
Sleeping more than usual	0	1	2	3	4	5	6						
Sleeping less than usual	0	1	2	3	4	5	6						
Drowsiness	0	1	2	3	4	5	6						
Sensitivity to light	0	1	2	3	4	5	6						
Sensitivity to noise	0	1	2	3	4	5	6						
Irritability	0	1	2	3	4	5	6						
Sadness	0	1	2	3	4	5	6						
Nervousness	0	1	2	3	4	5	6						
Feeling more emotional	0	1	2	3	4	5	6						
Numbness or tingling	0	1	2	3	4	5	6						
Feeling slowed down	0	1	2	3	4	5	6						
Feeling mentally "foggy"	0	1	2	3	4	5	6						
Difficulty concentrating	0	1	2	3	4	5	6						
Difficulty remembering	0	1	2	3	4	5	6						
TOTAL SCORE													

Management - General

- Treat Symptoms
 - Avoid NSAIDs in first 48 hours, acetaminophen OK
 - Avoid nausea medications initially – ondansetron
promethazine for prolonged nausea
- Avoid triggers
- Optimize sleep
 - Sleep hygiene
 - Omit napping
 - Melatonin for prolonged issues

Management - Rest

- Current management includes “...physical and cognitive rest until the acute symptoms resolve and then a graded program of exertion prior to medical clearance...”
- Initial rest period of 24-48 hours “...may be of benefit”
- “...optimal amount and type of rest...” is not yet known
- Return to academics and social activity should be done in a “...manner that does not result in significant exacerbation of symptoms”

Relative Rest

- Cognitive and physical rest
- May include academic accommodations
 - Reduced workload
 - Extended time for exams and assignments
 - Shortened school day
 - Rest breaks
 - Repetition and written instructions
 - Seating away from bright lights and noise
 - Sunglasses

Relative Rest

- Avoid activities that exacerbate symptoms
 - Video games and computer work
 - TV in small amounts usually OK
- Allow some activity and interaction with others
- Increase activities as symptoms improve

Strict Rest versus Relative Rest

- Recent inquiry into defining rest
- Further research is needed to determine optimal recommendations with regard to rest
- *Pediatrics* study, February 2015, suggests strict rest offers no added benefit over relative rest
 - Strict rest may have contributed to increased symptom reporting

Pediatrics Study

- Prospective randomized controlled trial
- 88 patients, median age 13.7, randomized to strict rest for 5 days or “usual care” (1-2 days of rest)
- All participants kept diary to record physical and mental activity level; record symptoms – used to calculate energy expenditure
- Neurocognitive and balance assessments preformed at 3 and 10 days post injury
- Evaluation of symptoms/diary

Pediatrics Study

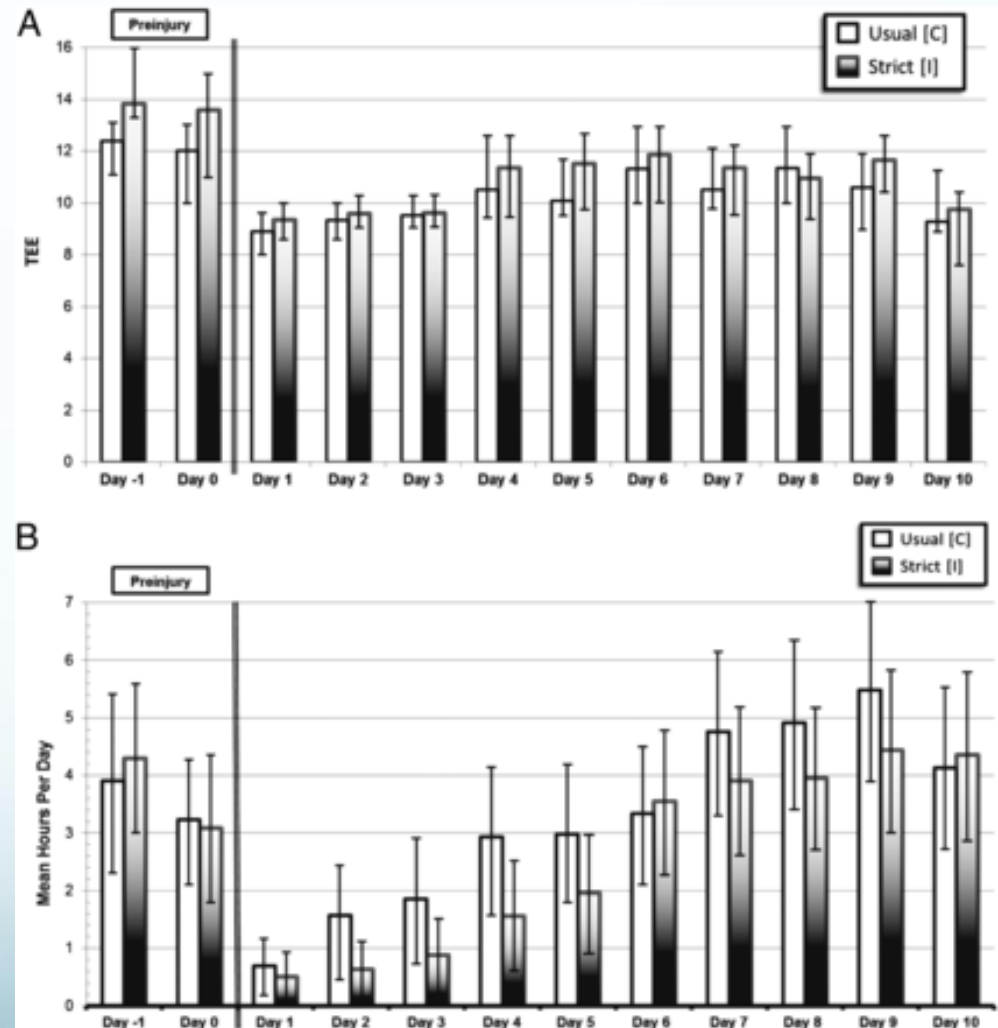
- Inclusion criteria:
 - 11-22 years old
 - Presentation to ED within 24 hours of injury
 - Diagnosis of concussion
- Exclusion criteria:
 - Non-English speaking
 - Intellectual disability (IQ <70)
 - Previous mental defect or disease
 - ADHD, learning disability
 - Intracranial injury or hospital admission

Pediatrics Study

- All participants kept Activity Diary (validated)
- Activity Diaries used to calculate energy expenditure
- Diary included Post-Concussive Symptom Scale
- Neurocognitive and balance testing at days 3 and 10
 - ImPACT – computerized, validated to detect deficits
 - BESS – objective measure of postural stability, high specificity and good test-retest reliability

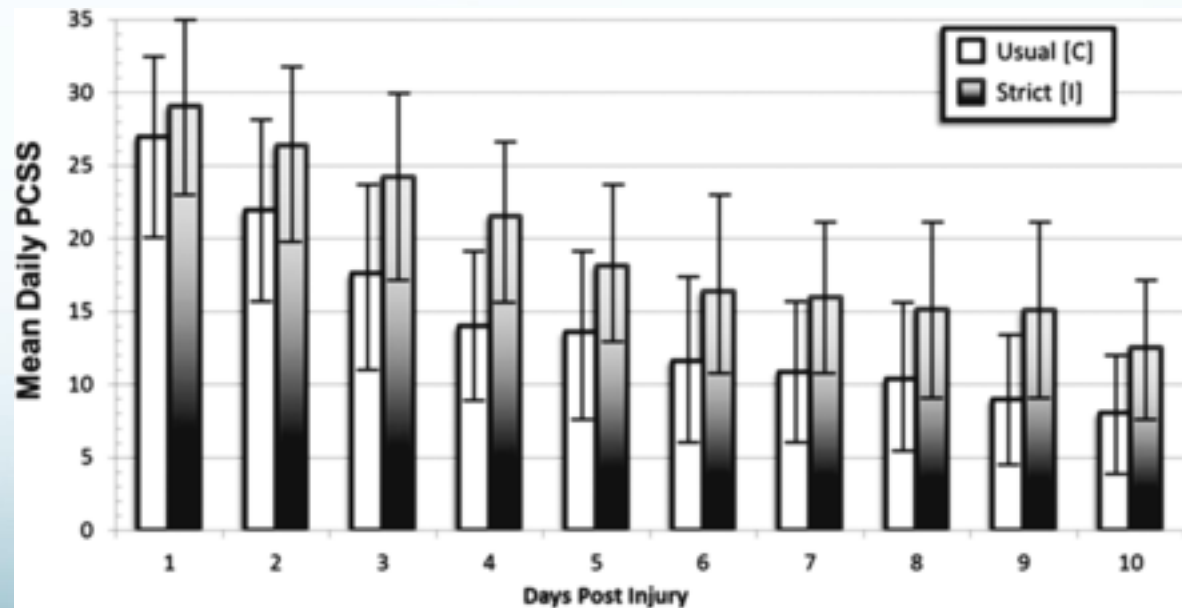
Pediatrics Study

- Both groups similar reduction in energy expenditure
- Control group had more total hours in high and moderate mental activity on days 2-5



Pediatrics Study

- No significant difference between groups in neurocognitive tests or balance at 3 and 10 days
- Main outcome shows difference in time for symptom resolution between control and study groups



Pediatrics Study

- Highlights
 - Strict rest did not improve outcomes and may have prolonged symptom duration
 - There was no difference in neurocognitive or balance outcomes between groups
 - Patients with history of concussion reported greater symptoms at day 10

Role of Rest

- Moderate rest is important to recovery, but strict rest may be detrimental
 - Majerske et al (2008) found moderate activity post concussion had the best neurocognitive and symptom scores at follow up (compared with high and low levels of post-injury activity)
 - Brown et al (2014) found a correlation between high cognitive activity after concussion and longer symptom duration
- Finding a level of activity (cognitive and physical) that doesn't exacerbate symptoms is dependent on the individual

Return to Academics/Work and Sport

- Return to Academics/Work FIRST
 - May take time
 - Should be gradual
 - Limit time out of school/work as much as possible
 - Accommodations likely necessary
- Return to Play
 - AFTER full return to academia
 - Graduated, step-wise process
 - Monitored by athletic trainer if possible

Return to Academics

- Letter for school dictating diagnosis and highlighting accommodations is helpful
- Graduated protocols for return to academics are available (“Returning to Learning Following a Concussion” *Pediatrics* 2013)
- No testing, extended time for assignments, ability to leave classroom, permission for sunglasses, etc
- Note should also stipulate no PE class, sports, exertion

When to start Return to Play

- Asymptomatic for 24 hours with **full academic participation**
- Off all medications
- Monitored by reliable source

Return to Play

STEP

No Activity

Light Aerobic Exercise

Increased Aerobic Exercise

Sport-Specific Exercise

Non-contact Training Drills

Full-contact Practice

GOAL

Rest

Increase HR

Increase HR

Add Movement

Exercise, Coordination,
Cognitive Load

Restore Confidence;
Assess Skills

**SEE HEALTH CARE PROFESSIONAL FOR CLEARANCE TO RETURN
TO SPORT**

Return to Play

- Graduated
- Monitored by ATC or reliable source
- Symptoms may recur
- Return to previous level
- Final RTP determined by physician

Physician Notes

- Become very important when managing concussed patients
- Need to be clear in recommendations
- Often each patient will require several notes

School Note Example

Date: _____

Regarding: _____

To school administration and teachers:

I saw _____ in clinic today for concussion. It is imperative for recovery that he/she be allowed accommodations at school and with exams and homework. Some accommodations that may benefit him/her are listed below, though this list is by no means all inclusive.

- Allow student to wear sunglasses and/or hat in classroom if light is bothersome
- Allow student to go to quiet place (such as library) if classroom is too noisy
- Allow student extra time for assignments
- Allow student to take breaks from sitting in class or being on computers frequently
- Do not have student take any examinations until symptoms are improved

Additionally, he/she should not participate in any physical exertion including physical education classes and sports.

If there are any questions, please do not hesitate to contact my office.

Thank you,

Return to Contact Example

Date: _____

Regarding: _____

To whom it may concern:

I have been seeing and treating _____ for a concussion and feel that he/she has progressed well through the "Return to Play" protocol. At this point, he/she is cleared for full-contact game play.

If you have any questions or concerns, please do not hesitate to contact my office.

Sincerely,

Notes... what not to do

To Whom It May Concern:

[REDACTED] was seen today. Please excuse Him absence concussion grade 1 ok return contact 10/7/14 due to illness.

“Once patient returns to school, please continue to follow concussion guidelines until it is designated by mother that she has recovered fully.”

When to Refer

- Presence of confounders
- Discomfort with duration of symptoms or progress
- Post-concussive syndrome
 - Persistent symptoms with or without treatment
 - Concern for decreased threshold
- No specific guidelines

Modifiers/Confounders

- History of concussion
 - Proximity
 - Duration of symptoms
- Age
- Preexisting conditions
 - Migraine
 - Depression/Anxiety
 - ADHD
 - Learning Disability

What we reviewed

- Evaluation of concussed patient
- What the role of rest in concussed patients is
- Return to academics and sport
- When referral indicated

Resources for Providers

American Medical Society for Sports Medicine position statement: concussion in sport

Consensus Statement on Concussion in Sport: The 4th International Conference on concussion in Sport (Zurich Nov 2012)

American Medical Society for Sports Medicine position statement: concussion in sport 2013

Concussion (Mild Traumatic Brain Injury) and the Team Physician: A Consensus Statement—2011 Update

Additional References

- Brown NJ, et al. Effect of cognitive activity level on duration of post-concussion symptoms. *Pediatrics*. 2014;133(2). C.R.S. 25-43-101. “Jake Snakenberg Youth Concussion Act.” Effective 1 Jan 2012.
- Eisenberg MA, et al. Time Interval Between Concussions and Symptom Duration. *Pediatrics*. 2013 Jul;132(1):8-17
- Halstead, ME et al. Returning to Learning Following a Concussion. *Pediatrics*. 2013 Oct; 132:948-57.
- Majerske CW, et al. Concussion in sports: post-concussive activity levels, symptoms and neurocognitive performance. *Journal of Athletic Training*. 2008;43(3):265-74.
- McCrea, M et al. Evidence-based management of sport-related concussion. *Progress in Neurological Surgery*. 2014;28:112-27
- Moser, RS et al. Examining prescribed rest as treatment for adolescents who are slow to return from concussion. *Brain Injury*. 2015;29(1):58-63
- Petraglia, et al. From the Field of Play to the Field of Combat: A Review of the Pharmacological Management of Concussion. *Neurosurgery*. 2012 Jun;70(6):1520–33.
- Purcell, LK et al. Sport-related concussion: Evaluation and management. *Pediatric Child Health*. 2014 Mar;19(3):153-65
- Rivara GR et al. *Sports-Related Concussions in Youth: Improving the Science, Changing the Culture*. 2014 Feb 4.
- Stoller, J et al. Do family physicians, emergency department physicians and pediatricians give consistent sport-related concussion management advice? *Canadian Family Physician*. 2014 Jun;60:548-52.
- Thomas, DG et al. Benefits of Strict Rest After Acute Concussion: A Randomized Controlled Trial. *Pediatrics*. 2015 Feb;135(2).