Case

- 15 year
- Practice
- No know
- 2 weeks
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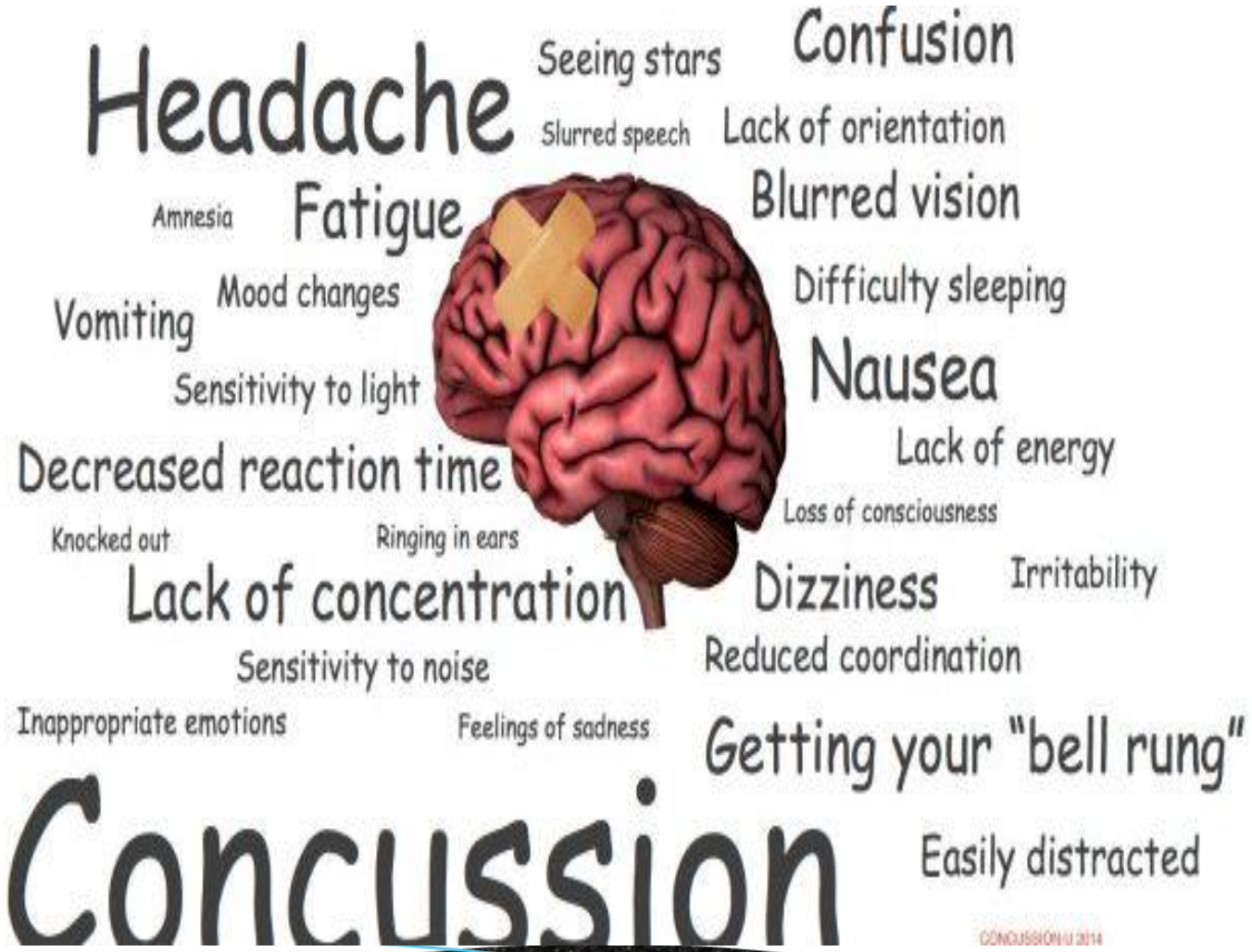
  last mon



oms throughout the season.

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ve mostly resolved over the

What is a concussion?

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- Mild traumatic brain injury
- A disruption in normal brain function due to a blow or jolt to the head

  Centers for Disease Control

- A trauma induced alteration in mental status that may or may not involve loss of consciousness

  American Academy of Neurology

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Epidemiology of Concussion

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- Estimated between 1.7-3 million sports related concussions/yr
- 50% of concussions go unreported
- Falls, MVCs, assaults, and sports are the most common causes.
- 20% of high school athletes who play contact sports will get a concussion this year
- Highest risk age group 15-24 years
- Risk of concussion is 4-6 X greater after one
- Risk is 8 X greater after two

https://www.upmc.com/services/sports-medicine/services/concussion/about/facts-statistics
https://www.cdc.gov/traumaticbraininjury/data

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es

- S concussion
  - OC < inute (if any)
  - esolves days
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  - mplex con
  - LOC > 1
  - ympt longer – 10 d
  - tory multiple conc sions
  - sing "concussability"

l hlete
ret in the
cu game
o ctice

McCrory et al. Summary and agreement statement of the 2nd international conference on concussion in sport, Prague 2004. Clin J Sport Med. 2005;(15)2:48-55

2016 : International Consensus statement on concussion in sport
Diagnosing Concussion Clinically

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- Sport related concussion is a traumatic brain injury induced by biomechanical forces. Several common features that may be utilized in clinically defining the nature of a concussive head injury include:
  - SRC may be caused **either** by a **direct blow** to the head, face, neck **or elsewhere on the body** with an impulsive **force transmitted to the head**.
  - SRC **typically** results in the **rapid onset of short-lived impairment** of neurological function that **resolves spontaneously**. However, in some cases, signs and symptoms **evolve over a number of minutes to hours.**
  - SRC may result in neuropathological changes, but the **acute clinical signs and symptoms largely reflect a functional disturbance rather than a structural injury** and, as such, no abnormality is seen on standard structural neuroimaging studies.
  - SRC results in a range of clinical signs and symptoms that may or **may not involve loss of consciousness**. Resolution of the clinical and cognitive features typically follows a sequential course. However, in some cases symptoms may be prolonged.

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The clinical signs and symptoms cannot be explained by drug, alcohol, or medication use, other injuries (such as cervical injuries, peripheral vestibular dysfunction, etc) or other comorbidities (eg, psychological factors or coexisting medical conditions).

Common Symptoms After Concussion

- Symptoms:
  - Somatic:
    - *Headache*
  - Cognitive:
    - *Feeling like in a fog*
  - Emotional symptoms:
    - *Lability, lack of motivation, mood swings*
- Physical signs:
  - *Loss of consciousness, amnesia, neurological deficit*
- Balance impairment:
  - *Gait unsteadiness*
- Behavioral changes:
  - *Irritability*
- Cognitive impairment
  - *Slowed reaction times, difficulty concentrating*
- Sleep/wake disturbance
  - *Somnolence, drowsiness*

Neurometabolic Cascade of Concussion

- A complex physiological process induced by traumatic biomechanical forces
- Release of excitatory neurotransmitters
- Stretching and tearing of brain cells
  - Abnormal glucose metabolism
  - Altered cerebral blood flow
- The brain goes into an *ENERGY CRISIS* that can last weeks

Giza C, Hovda D.The Neurometabolic Cascade of Concussion. *J of Athletic Train. 2001;36(3):228-235*

Why should we take initiative in the UC or ED setting?

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- We may be the only visit for this particular injury
- Like it or not, our setting is becoming the surrogate medical home for injuries and illness
- If we don't take the time to explain and give proper information, that may lead the way for long term issues

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What can we do to help from an UC/ED perspective?

1. **Screen with simple EB tools**

   - **SCAT5/Child SCAT5**

SCAT5©

SPORT CONCUSSION ASSESSMENT TOOL – 5TH EDITION

DEVELOPED BY THE CONCUSSION IN SPORT GROUP

FOR USE BY MEDICAL PROFESSIONALS ONLY

supported by

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- Standardized tool for evaluating concussions designed for use by physicians and licensed healthcare professionals.
- Typically, cannot be performed correctly in < 10 minutes.
- For evaluating athletes > 13 years old.
- Use Child SCAT5 for ≤12 years
- Immediate or on-field assessment *and* Office or off-field assessment

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- Office or off-field assessment
  1. Athlete background
  2. Symptom evaluation
  3. Cognitive screening
  4. Neurologic screen
  5. Delayed recall
  6. Decision

Office or Off-Field Assessment

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OFFICE OR OFF-FIELD ASSESSMENT

Please note that the neurocognitive assessment should be done in a distraction-free environment with the athlete in a resting state.

STEP 1: ATHLETE BACKGROUND

Sport / team / school: _____

Date / time of injury: _____

Years of education completed: _____

Age: _____

Gender: M / F / Other

Dominant hand: left / neither / right

How many diagnosed concussions has the athlete had in the past?: _____

When was the most recent concussion?: _____

How long was the recovery (time to being cleared to play) from the most recent concussion?: _____ (days)

Has the athlete ever been:

Hospitalized for a head injury?	Yes	No
Diagnosed / treated for headache disorder or migraines?	Yes	No
Diagnosed with a learning disability / dyslexia?	Yes	No
Diagnosed with ADD / ADHD?	Yes	No
Diagnosed with depression, anxiety or other psychiatric disorder?	Yes	No

Current medications? If yes, please list:

_____

2

STEP 2: SYMPTOM EVALUATION

The athlete should be given the symptom form and asked to read this instruction paragraph out loud then complete the symptom scale. For the baseline assessment, the athlete should rate his/her symptoms based on how he/she typically feels and for the post injury assessment the athlete should rate their symptoms at this point in time.

Please Check: ☐ **Baseline** ☐ **Post-Injury**

Please hand the form to the athlete

	none	mild		moderate		severe	
Headache	0	1	2	3	4	5	6
"Pressure in head"	0	1	2	3	4	5	6
Neck Pain	0	1	2	3	4	5	6
Nausea or vomiting	0	1	2	3	4	5	6
Dizziness	0	1	2	3	4	5	6
Blurred vision	0	1	2	3	4	5	6
Balance problems	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
Feeling slowed down	0	1	2	3	4	5	6
Feeling like "in a fog"	0	1	2	3	4	5	6
"Don't feel right"	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
Fatigue or low energy	0	1	2	3	4	5	6
Confusion	0	1	2	3	4	5	6
Drowsiness	0	1	2	3	4	5	6
More emotional	0	1	2	3	4	5	6
Irritability	0	1	2	3	4	5	6
Sadness	0	1	2	3	4	5	6
Nervous or Anxious	0	1	2	3	4	5	6
Trouble falling asleep (if applicable)	0	1	2	3	4	5	6
Total number of symptoms:							of 22
Symptom severity score:							of 132
Do your symptoms get worse with physical activity?						Y	N
Do your symptoms get worse with mental activity?						Y	N
If 100% is feeling perfectly normal, what percent of normal do you feel?							

If not 100%, why?

_____

_____

Please hand form back to examiner

1. Maddocks questions were modified to include questions more appropriate to children engaged in both organized and playground sport
2. Symptom Evaluation was changed from the adult version of the Post-Concussion Symptom Scale to the Health and Behavior Inventory, which is a validated symptom list for both child-reported and parent- reported symptoms
3. Orientation assessment did not include the time question because most young children cannot answer this question
4. Digits Backwards introduced a two-digit string because many younger children could not perform this task with three-digit strings.
5. Months in Reverse Order was changed to Days of the Week because many young children could not recite the months in order
6. Balance Examination removed the single-leg stance because many younger children were unable to perform this task
7. Return to School information was provided for the child athlete

What can we do to help from an UC/ED perspective?

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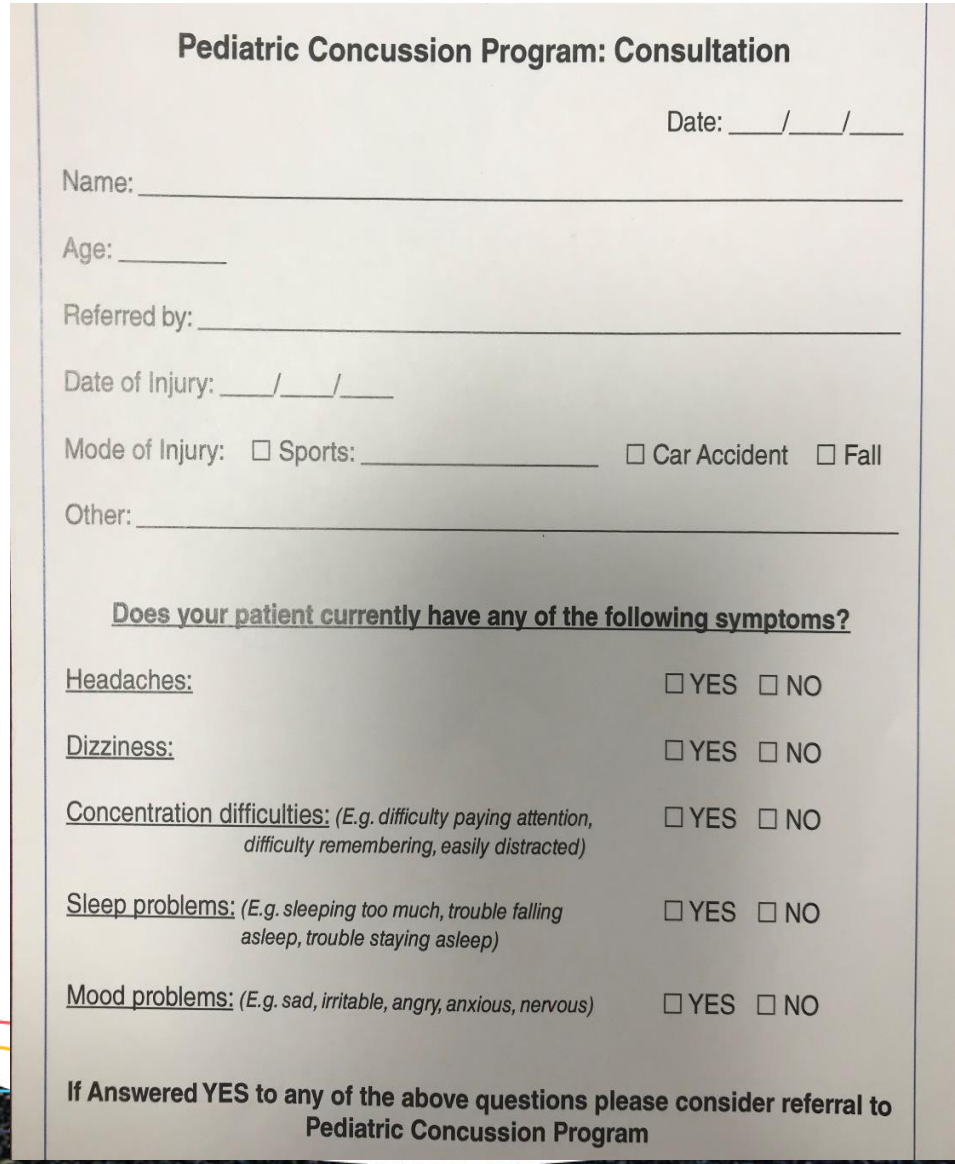
1. Screen with EB tools
   - SCAT5/Child SCAT5
2. **<u>Work with your local concussion clinic and assure quick follow up</u>**
   1. **Can use a simple assessment tool to stratify who needs a quicker follow up**



Pediatric Concussion Program: Consultation

Date: ____/____/____

Name: _____

Age: _____

Referred by: _____

Date of Injury: ____/____/____

Mode of Injury: ☐ Sports: _____ ☐ Car Accident ☐ Fall

Other: _____

Does your patient currently have any of the following symptoms?

Headaches:	☐ YES ☐ NO
Dizziness:	☐ YES ☐ NO
Concentration difficulties: *(E.g. difficulty paying attention, difficulty remembering, easily distracted)*	☐ YES ☐ NO
Sleep problems: *(E.g. sleeping too much, trouble falling asleep, trouble staying asleep)*	☐ YES ☐ NO
Mood problems: *(E.g. sad, irritable, angry, anxious, nervous)*	☐ YES ☐ NO

If Answered YES to any of the above questions please consider referral to Pediatric Concussion Program

What can we do to help from an UC/ED perspective?

1. Screen with EB tools
   - SCAT5/Child SCAT5
2. Work with your local concussion clinic and assure quick follow up
3. **<u>Offer treatment options</u>**
   - Symptom Relief
     - Rest
     - Fluids
     - Time
     - Analgesia
       - Acetaminophen
       - Ibuprofen
     - Nausea and Vomiting
       - Insure hydration
       - Ondansetron

Post-Concussion Syndrome (PCS)

- Symptoms of concussion that can persist for days, weeks, months, or indefinitely
- Many improve in 7- 10 days, most by 3 months
- 5% - 15% of adults still have PCS symptoms one year after injury
- Less is known about the prevalence and duration of PCS in youth

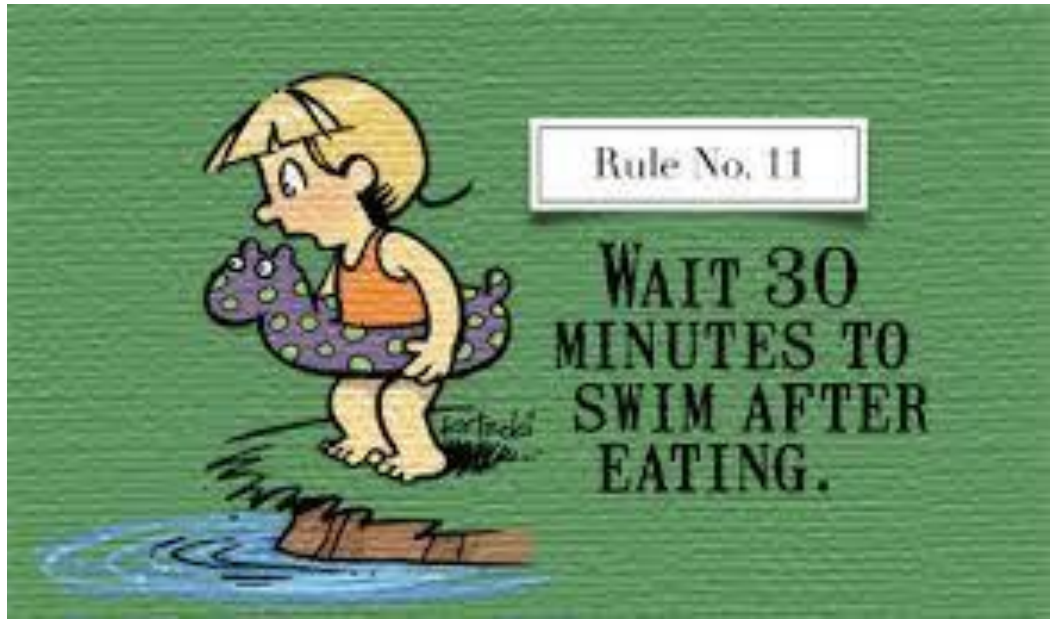
Post-Concussion syndrome

- Symptoms are worsened by . . .
  - ✓ mental effort
  - ✓ environmental stimulation
  - ✓ emotional stress
  - ✓ physical activity

What can we do to help from an UC/ED perspective?

1. Screen with EB tools
   - SCAT5/Child SCAT5
2. Work with your local concussion clinic and assure quick follow up
3. Offer treatment options
4. **<u>Advocate Return to school guidelines and implement gap plan until follow up (not just return to play)</u>**

Return to Sport guidelines?



Concussions:

Return to sport, school, work, etc

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- **<u>Not typically an UC/ED or first day decision.</u>**
- Symptoms may progress; tell patients this.
- Thorough discharge instructions; insure good follow – up.
- Clearance before return to play or work.
- Develop a return to school strategy
- Enforcement.
- If sx's persist: referral to specialist.

Return Strategies

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Table 1 Graduated return-to-sport (RTS) strategy

Stage	Aim	Activity	Goal of each step
1	Symptom-limited activity	Daily activities that do not provoke symptoms	Gradual reintroduction of work/school activities
2	Light aerobic exercise	Walking or stationary cycling at slow to medium pace. No resistance training	Increase heart rate
3	Sport-specific exercise	Running or skating drills. No head impact activities	Add movement
4	Non-contact training drills	Harder training drills, eg, passing drills. May start progressive resistance training	Exercise, coordination and increased thinking
5	Full contact practice	Following medical clearance, participate in normal training activities	Restore confidence and assess functional skills by coaching staff
6	Return to sport	Normal game play	

NOTE: An initial period of 24–48 hours of both relative physical rest and cognitive rest is recommended before beginning the RTS progression.
There should be at least 24 hours (or longer) for each step of the progression. If any symptoms worsen during exercise, the athlete should go back to the previous step.
Resistance training should be added only in the later stages (stage 3 or 4 at the earliest). If symptoms are persistent (eg, more than 10–14 days in adults or more than 1 month in children), the athlete should be referred to a healthcare professional who is an expert in the management of concussion.

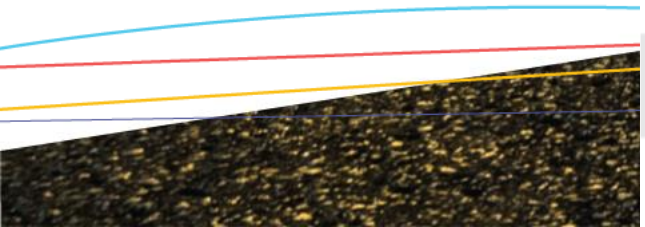
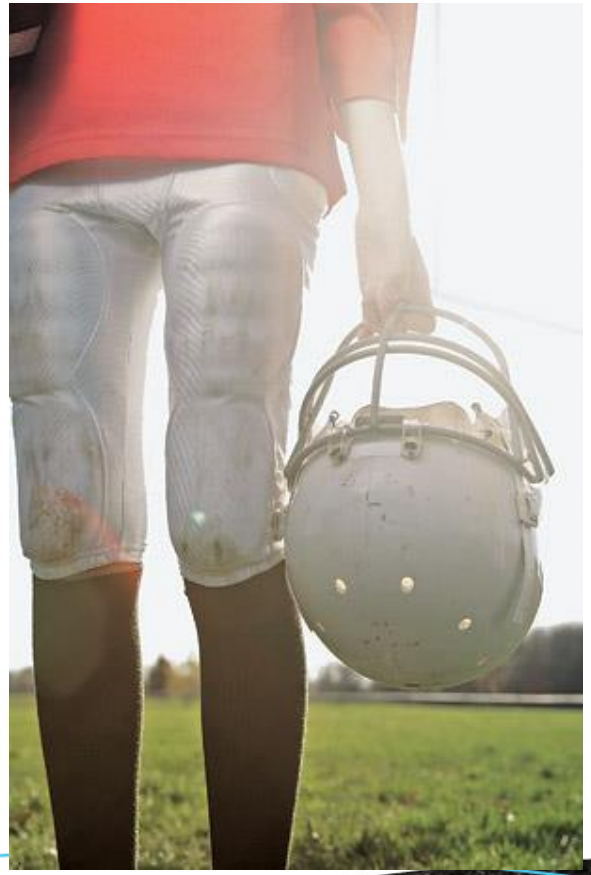


Table 2 Graduated return-to-school strategy

Stage	Aim	Activity	Goal of each step
1	Daily activities at home that do not give the child symptoms	Typical activities of the child during the day as long as they do not increase symptoms (eg, reading, texting, screen time). Start with 5–15 min at a time and gradually build up	Gradual return to typical activities
2	School activities	Homework, reading or other cognitive activities outside of the classroom	Increase tolerance to cognitive work
3	Return to school part-time	Gradual introduction of schoolwork. May need to start with a partial school day or with increased breaks during the day	Increase academic activities
4	Return to school full time	Gradually progress school activities until a full day can be tolerated	Return to full academic activities and catch up on missed work

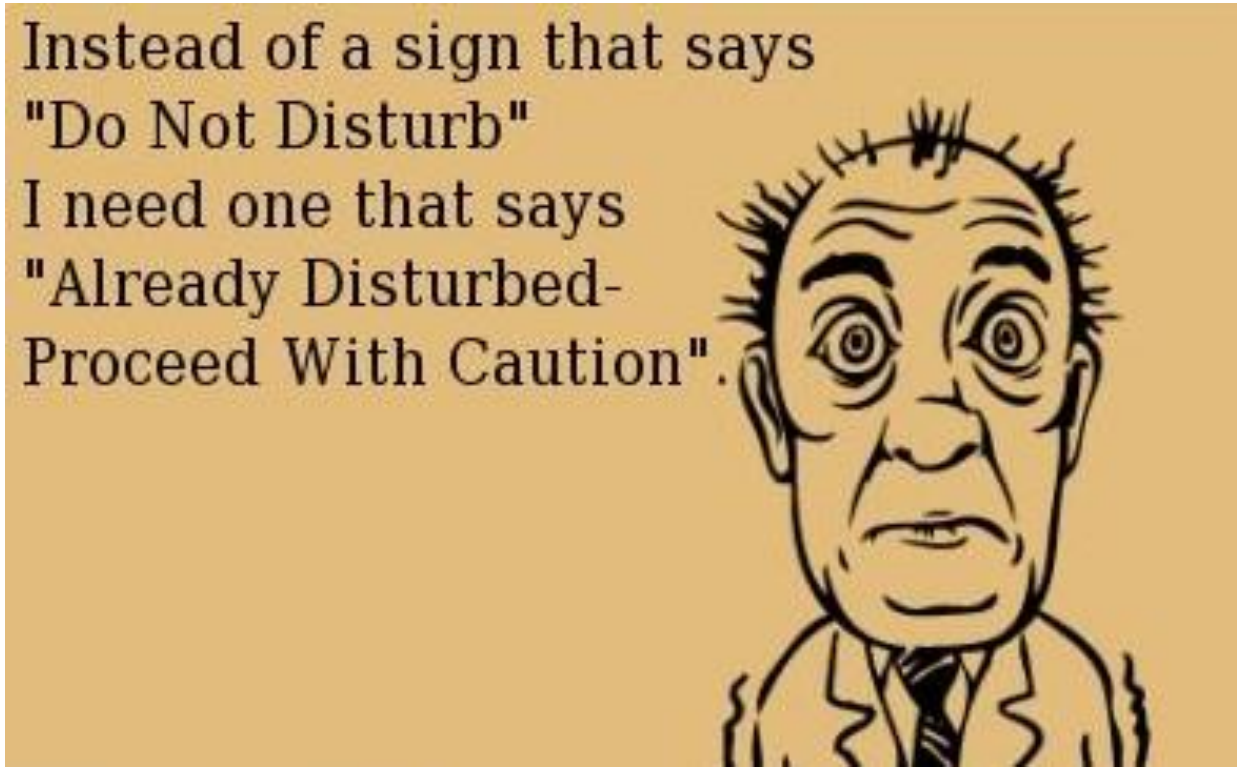
Why are we so concerned about asymptomatic return to sport?



Second Impact Syndrome

- "An athlete who has sustained an initial head injury, most often a concussion, sustains a second head injury before symptoms associated with the first have fully cleared"
- Estimated rate of 1-2 cases annually per 100,000 sport related concussions
- 50% mortality and ~100% have permanent brain damage

Silent Functional and structural disturbances?



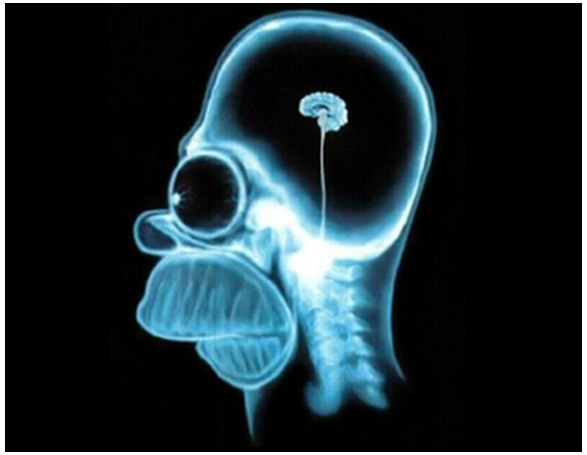
Many Reports of Silent Functional and Structural Disease

- Studies of football and hockey players (Crisco J, et al)
  - ~1000 hits per season
  - Mean acceleration of 20 G

Crisco J, et al. J Athl Train. 2010 Nov-Dec; 45(6): 549–559

Many Reports of Silent Functional and Structural Disease

- Functional MRI in football players (15-19) pre and post season
  - 0 tested for symptomatic concussion
  - Ability to complete assigned tasks & overall cognition were ↓ post season
    - Extent of impairment correlated to the number of hits to the head



Talavage t, et al. Journal of Neurotrauma.Feb 2014.

Many Reports of Silent Functional and Structural Disease

- Youth Football Changes Nerve Fibers in Brain
  - 26 male youth football players, average age 12, underwent MRI studies before and approximately three months after the season was over.
  - 22 who did not participate in contact sports had MRIs on the same schedule.

Jeongchul Kim, Ph.D, et al. annual meeting of the Radiological Society of North America

STUDY:
Youth Football Changes Nerve Fibers in Brain

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- The MRI results showed that the football players developed changes in the corpus callosum
- There were signs of greater contraction in some parts of the corpus callosum, and indications of expansion in other parts
- The results suggest that:
  - Repetitive subconcussive head impacts associated with participation in youth contact sports could lead to changes in the shape of the corpus callosum during this critical time of brain development

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Jeongchul Kim, Ph.D, et al. annual meeting of the Radiological Society of North America

UC/ED concussion playbook

- **Pregame:**
  - Develop a evaluation and follow up plan
- **Gameday:**
  - Keep the evaluation quick and easy. Develop a protocol for a portion of the evaluation to be done by support staff
- **Postgame:**
  - If concussion is diagnosed, final return to play is not really in the UC/ED playbook.
  - Plan a follow up with a concussion program or equivalent

Now back to our future NFL hall of famer

- 15-year-old football player, straight A student preseason.
- Practiced daily during season and started in all games.
- No known significant injuries and never complained of symptoms throughout the season.
- 2 weeks until the state championship and he has mild complaints of difficultly concentrating in class and occasional mild headaches that have mostly resolved over the last month or so.

Session Evaluation

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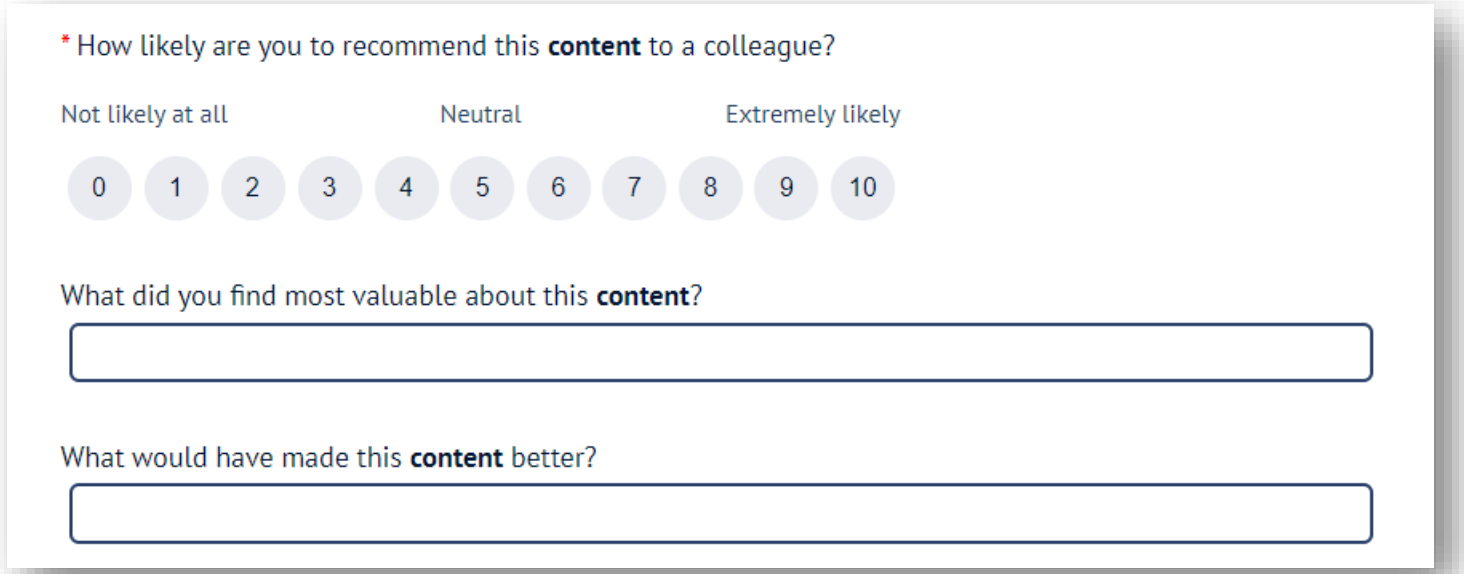
- Your feedback is valuable, take a moment to complete the survey for this session.
- To claim CME, you must complete a separate survey available after the convention.



Thank you

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Q&A time