



No Un-ringing the Bell: Concussion Recognition, Evaluation & Management

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Powers
HEALTHSM

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Concussion need not be a catastrophe: managed properly, it rarely is.

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Disclosure Statement

- I have no commercial interest to disclose
- I do not intend to discuss off-label use of FDA approved pharmaceuticals

Learning Objectives

At the end of this presentation, participants will be able to:

- Describe the signs & symptoms that would cause suspicion of concussion.
- Describe the steps necessary for a preliminary evaluation for concussion.

Learning Objectives

At the end of this presentation participants will be able to:

- Describe signs & symptoms of concussion, particularly those identified as “video signs.”
- Distinguish between risk factors that contribute to a prolonged course of recovery from concussion and those that contribute to CTE.
- Describe best practices for management of recovery from concussion.
- Describe best practices for management of recovery from concussion.

Pre-test

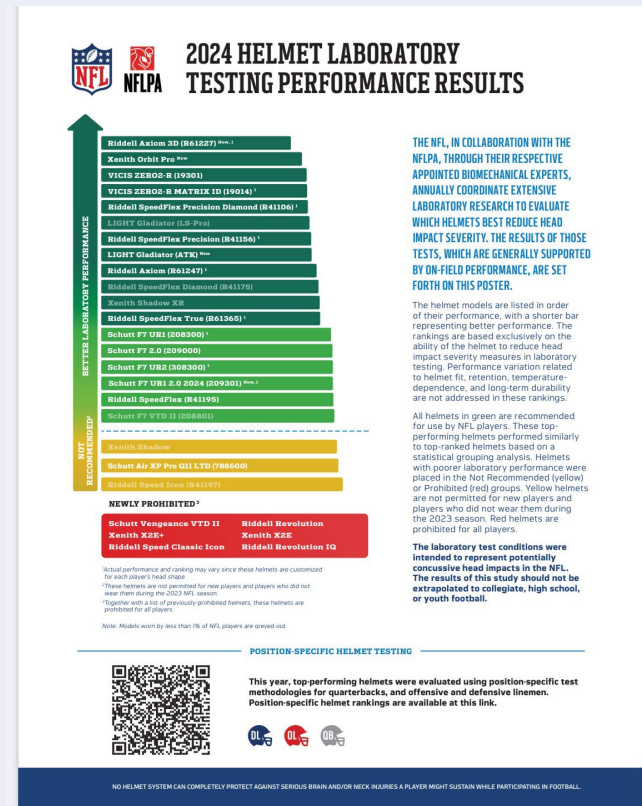
- Loss of consciousness is the most common symptom of concussion. **T or F?**
- The primary risk factor for development of CTE is:
 - A. Genetic predisposition
 - B. Number of concussions
 - C. Years of playing a contact/collision sport.
- An athlete diagnosed with a concussion may return to play the same day as the concussion has occurred if symptoms have cleared and (s)he has a written release from a physician. **T or F?**

**Awareness
& Interest**
have never
been
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Awareness & Interest have never been higher.

- **Helmet intended to prevent skull fracture.**
- **Helmets – to date – have not prevented concussion, despite lab results.**
(Emory/UCincinnati 2021 & 2022)
- **Helmets *may* prevent longer term issues.**
(Emory/UCincinnati 2021 & 2022)
- **Guardian Caps do not prevent concussion.**
(Stanford, UNC, Nevada 2023)
- **Soccer & rugby head gear ineffective.**
(Sports Health 2023)
- **Mouthguards have reduced concussion rates in youth hockey.**
(BJSM 2023)



Signs & Symptoms:

But unless your athlete or worker looks like the guy in the picture, you are unlikely to be aware, at least at first.

- 26 of 27 potential concussions go unreported at the NCAA Division 1 FCS level - formerly Division I-AA. (*Harvard 2014*)
- Many individuals prevaricate & symptom minimize to continue playing/working.
- 23% of children, age 5-17, w/symptoms not checked for concussion/TBI. (*Emory 2024*)
- 23.4% of CFL players reported having symptoms but 82.1% did not report. (*CJSM 2018*)

- **Staying in game/practice doubles recovery time** (*UPMC 2016*) /other effects.
- **State regs. require 24 hr. min.**
- Concussion consequences in the NFL:
 - Concussion diagnosis costs a player \$300,000-\$1,300,000 on his next contract.
 - 30% of concussed players still in League 3 years later but 54% of un-concussed were.
 - 12% still in League 5 years later but 37% of un-concussed were. (*Cleveland Clinic 2017*)



Video Signs = Concussion ...

no matter how they present moments to minutes later.

- **International Consensus including NFL, NHL & MLB** *(BJSM 2019)*

- Lying motionless.
- Motor Incoordination/ataxia/staggering gait/stumbles/stagger.
- No protective action—floppy.
- No protective action—tonic.
- Cervical hypotonia.
- Uncontrolled fall to ground.
- Controlled fall.
- Impact seizure/convulsion.
- Tonic posturing.
- Blank/vacant look.
- Dazed.
- Slow to get up.
- Clutching at head.
- Walking away from pitch disengaged with game.
- Disorientation.
- Confusion/behavior change.

IGNORING THESE SIGNS HAS CONSEQUENCES !

Anthony Rizzo 5/28/23



Anthony Rizzo 5/28/23

Consensus Signs

- Lying motionless

Motor Incoordination/ataxia/ staggering gait/stumbles.

- No protective action-floppy
- No protective action-tonic
- Cervical hypotonia
- Impact seizure/convulsion
- Tonic posturing
- Blank/vacant look

History Before & Since

- Missed One Series with “neck injury”
- Before: .304 BA, 11 HR, 32 RBI
- After: .172 BA, 1 HR, 9 RBI
- 8/3/23: Put on injured list with “Post-concussion Syndrome”
- Did not return
- Thru 6/12/24: .221 BA, 7 HR, 26 RBI (*Career BA .262*)
- “Batting performance significantly poorer 1 year after concussion & over remainder of the players’ careers” (*Northwestern 2020*)

Post Concussion Syndrome

Persistence of Symptoms, 3 months post-injury

Predictors *(Morgan, J Neursurg Pediatr. 2015)*

- Previous history of concussion
- Mood disorders & other psychiatric illness
- Family history of mood disorders & other psychological issues
- Migraine HA
- Delayed symptom onset

Recovery *(Hiploylee, J Neurotrauma, 2016)*

- Recovery rate only 27%
- 67% of those who do recover do so within first year
- If symptoms persist 3 years or longer, no recovery

Tua Tagovailoa 9/25/22



Tua Tagovailoa 9/25/22

Consensus Signs

- Lying motionless
- **Motor Incoordination/ataxia/staggering gait/stumbles**
- No protective action-floppy
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Cervical hypotonia

- Impact seizure/convulsion
- Tonic posturing
- Blank/vacant look

Other Signs

- **Slow to get up**
- **Uncontrolled fall to ground**
- **Clutching at head**

Immediate “Management”

- Missed remainder of 1st half, sent to locker room, in “concussion protocol”
- Returned to play in 2nd half, observed signs were caused by “back injury”
- Allowed to play 4 days later
- When we know 91.7% of 2nd concussions in same season occur within 10 days of 1st
(Guskiewicz, JAMA 2003)

Tua Tagovailoa 9/29/22



Tua Tagovailoa 9/29/22

Consensus Signs

Lying motionless.

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Tonic posturing.

- Blank/vacant look.
- *90% of 2nd concussions in same season occur within 10 days of the first. (JAMA 2003)*

History Before & Since

- 9/22 game, injury “re-labeled.”
- Not maintained in concussion protocol. Allowed to play 4 days later.
- Unaffiliated neurotrauma consultant fired by NFLPA.
- Missed 2 games & allowed to return on 10/23.
- Coaching staff suspicious after 12/25 game. Acknowledged symptoms & season ended.
- “Fall” training in off-season and concussion-free in 2023.

2015 NBA Western Conference Finals

Steph Curry

Game 4



Klay Thompson

Game 5

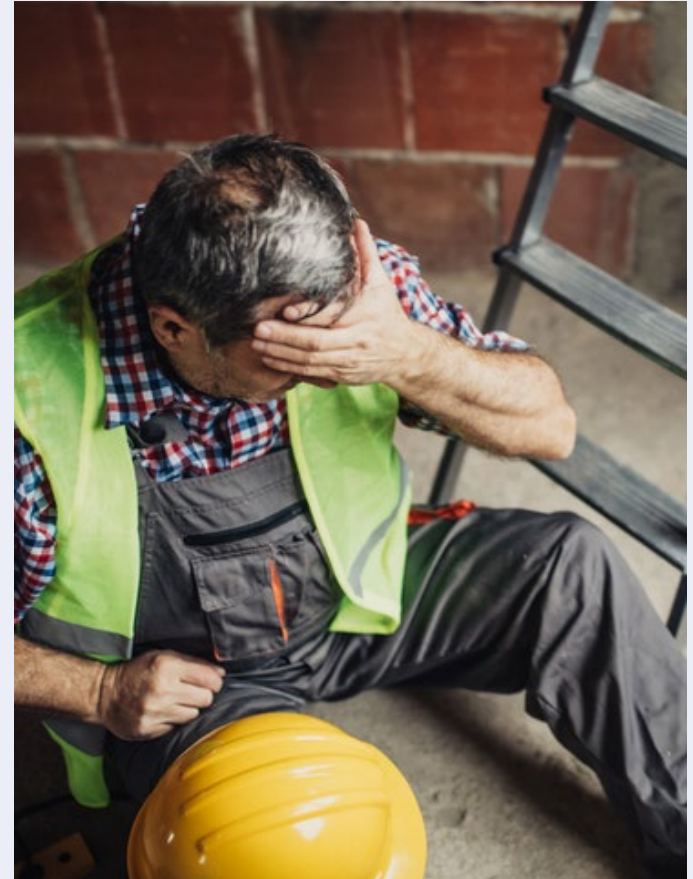


Clinical Signs & Symptoms:

- Headache: 94%
- Nausea/vomiting
- Dizziness/unsteadiness: 75.5%
- Fatigue
- Trouble falling asleep/sleeping too much
- Sensitivity to light: 34.4%
- Sensitivity to noise



- Irritability or sadness
- Feeling more emotional
- Feeling slowed down
- **Feeling mentally foggy**
- **Difficulty concentrating: 53.9%**
- **Difficulty remembering: 21.6%**
- **Confusion/disorientation: 44%**
- Visual changes
- **Loss of consciousness: 4.2%**
(Meehan, Am J Sports Med 2011)
- **Clear the Neck!**



Why a Concussion Clinic?

- 1. Specialized care may speed recovery per the CDC**
- 2. Referred to family MD or ER: wildly varying results**
 - Didn't have a concussion because no LOC
 - Had a concussion but normal neuro exam; full release immediately
- 3. 2017 Study of New England ERs** (*Journal of Neurotrauma, Feb. 2017*)
 - 35% absence of guidelines,
 - 57% inconsistent guidelines
 - 94% issued DC instructions but they were inconsistent
 - 13% no F/U time-frame
 - 25% no specialist recommended

Started in 2011 for athletes, but now well *less than half*

Treatment Recommendations:

- Education, education, education
- **No driving, @ least 24 hours** (*Accident Analysis & Prevention, June 2015*)
& probably longer (*Journal of Neurotrauma, April 2017*)
- Limited cognitive exertion. That does not mean complete isolation or complete inactivity
- Monitoring of physical symptoms, intervening when appropriate (e.g., persistent dizziness)
- Making work accommodations

Optimizing Recovery

- Relative Rest
- Sub-threshold activity speeds recovery *(Zemek, JAMA 2016)*
- Graded rehab speeds recovery *(Gagnon, Scand J Med Sci Sports 2016)*
- Those who miss a day or two of school recover quicker than those who stay home for a week *(Thomas, Pediatrics 2015)*

Longer Recovery

- **Vestibular Rehabilitation**

- Vestibular Rehab works *(May 2014 BJSM)*

Center for Dizziness, Balance & Neuro Rehab, St. John

- **Cognitive Difficulties:**

- Requires Neuropsychology Consult

- **Pharmacology:**

- Meds: No NSAIDs. Acetaminophen only per NATA
- Omega 3 Fatty Acids *(Current Neurology & Neuroscience Reports, 2021)*

- **Imaging: SWI MRI, not CT Scan**

- After 48 hours, CT of little use

Years to Decades Later

- Increased risk of new affective or behavioral disorder for up to 4 years after sustaining mTBI among pediatric patients, especially among 10-13 years old. *(Pediatrics 2024)*
- *CTE risk tied to years of playing not number of concussions.* *(McKee & Cantu 2012, 2017, & 2023)*
- No additional risk of Dementia, Parkinson's Disease, ALS, or MCI from playing high school football. *(Savica, Mayo Clinic 2012, 2016, & 2019)*
- Risk of ALS among retired NFL players 3.59-8x normal *(BU 2010, 2021)*, among retired elite Italian soccer players 4.7-11.6 x normal. *(Rafael Guarinello, 2000) (ALS & Frontotemporal Degeneration, 2020)*
- Cortical thinning evident in collegiate football players years after retirement. *(Adler, Clin J Sport Med 2016)*
- Former NFL players at lower than normal risk of suicide. *(Iverson, J Neuropsychiatry Clin Neurosci 2016)*
- *History of concussion does not increase risk of Alzheimer's* but it appears to hasten onset in those genetically predisposed. *(Guskiewicz, Neurosurgery 2005) (Hayes, Brain 2017)*

Post-test

- Loss of consciousness is most common symptom of concussion. T or F?
- The primary risk factor for development of CTE is: A.
Genetic predisposition
 - B. Number of concussions
 - C. Years of playing a contact/collision sport
- A person diagnosed with a concussion should return to work/sport the same day as the concussion has occurred if his symptoms have cleared and (s)he has a written release from a physician. T or F?



NORTH C.

PERIOD

GUESTS

34

4

49

DOWN

YDS TO GO

BALL ON

PANT

