“Getting your bell rung”
“Getting your bell rung”

NO!
TBI: What is it?

• A concussion is a traumatic brain injury that alters the way the brain functions. Effects are usually temporary but can last for days or even months. Symptoms can include headaches, concentration issues, memory deficits and loss of balance/coordination.

• Although concussions are usually caused by a blow to the head, they can also occur when the head and upper body are violently shaken.

• These injuries can cause a loss of consciousness, but most do not.

• The patient is usually the last person to know they have a concussion.
Coup

Contracoup

"Brain suspended in a glass of water"
Signs and Symptoms

- Headache
- Dizziness/Balance Problems
- Nausea
- Vomiting
- Lack of Focus and concentration
- Sensitivity to light and sound
- feeling sleepy/unable to sleep
- loss of appetite
- hypersensitive emotions
- symptom onset may be delayed
Concussion vs. Contusion

Head Impact

No Bleeding vs. Bleeding

CT Normal vs. CT Not Normal

Resolves vs. May be an Emergency

No LOC vs. LOC = Go to ER
Biology of injury:

What happens to the nerves
Neurons Swell
Astrocytes Injured: Can’t feed and clean
Too Much Glutamate = Neuron Over Excited!

- Amnesia
- Cell Death
After Injury What happens?

- “Healing Factors”
- Inflammation + dysregulation
- Helps “clean up dead cells”
- Cleaning occurs after injury
- Less (activity) IS more to help cleaning
- This is why we “rest” the brain
Brain Needs time to Heal

• Ideal recovery environment includes complete rest with no external stimulation: No TV, No iPhone use, No Video games, No Crowds, etc.

• If the brain is stimulated, the rate of healing goes down.

• This is similar to other injuries, for example and arm or a leg injury.

• Resting the injured body part helps it heal faster.
Post-Concussive Syndrome

- WHO – Presence of 3 or more of symptoms No time duration given
- Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition--- 3 months duration of 3 or more symptoms
- Treat with symptom medications
- If mood changes consider Psych referral (SSRI)
- Usually lasts a week of so. Longer with each concussion

- headaches
- Nausea
- Abnormal sleep
- depressed affect
- mood alterations
- appetite changes
- fatigue
- slowed cognition/thoughts
- “not feeling like myself”
- "feel like I’m in a haze"
Increased Risks For Postconcussion Syndrome

- LOC
- Amnesia
- GCS <15
- Disorientation
- Mental Status Changes
- Prior Concussions
- HA 7 days out

- Female
- Hx. Cognitive dysfunction or anxiety and depression
- Migraine ? (+/-)
- Apolipoprotein E?
- Multiple symptoms at presentation: memory, longer HA, migraines, age, dizziness
Kaplan-Meier Curve of Symptoms

![Kaplan-Meier Curve of Symptoms](image)

FIGURE 1
Duration of symptoms by quartile of cognitive activity-days. Shaded area represents 95% confidence intervals for the curve.
<table>
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<th>Recovery</th>
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Second Impact Syndrome

• Experiencing a second concussion before signs and symptoms of a first concussion have resolved. While rare, this can be fatal.

• The time it takes to recover from a concussion varies. It is important for patients not to return to physical/mental activity while they’re still experiencing the symptoms of a concussion.

• The second impact can be likened to hitting a bruised area on the body, making the pain and initial bruise even worse.
NCAA and CDC Recommendations

• Any individual that shows signs of a concussion should be removed from all activity and not allowed to return until cleared by medical team.

• If it is determined that a concussion has occurred, individual will be removed from all activity for the remainder of the day and not allowed to return until all symptoms are clear and cleared by medical team.

Patient Based Care

- Everyone has different reactions to a concussion
- We need to treat each case individually
- No blanket statement for every concussion
- One size does not fit all!!
Return to Activity

- Patient must be symptom free before returning to training
- Gradual return to activity with no return of symptoms
- Normally accepted period of time is “24 hours symptom free”
- Medical clearance by MD/PA
- Continuing process. Testing…
**What Can I Do or Take to Help?**

**Exercise:** Controlled aerobic exercise will help recover

**Sleep:** Melatonin. It’s OTC and some use early

**ADHD:** Vayarin Omega 3’s  
2 capsules each day, EPA 43mg DHA 17mg and Phosphatidylserine 150mg. See decreased levels in ADHD, autism, Alzheimers, etc.

**Vertigo:** Vestibular Rehabilitation for vertigo (PT)

**Cognitive Behavior Treatment:** Change the thinking and behavior that makes the symptoms worse
What Can I Do or Take to Help?

Neurocognitive Rehabilitation: Cognitive tasks to improve attention, memory and functioning. Noise generators and Metronome

NSAIDS: No evidence it speeds recovery. May be used for Headache, etc.

Depression: Zoloft (Sertraline) Primary treatment for HI-depression and cognition
Trazodone 25-50mg at bedtime

Sleep and Headaches: Amitriptyline Low dose

Inattention: Methylphenidate, warning with sleep
Football players with multiple concussions:

- 7.7 times as likely to have “major drop in memory performance”
- 3 months later “persistent deficits”
- 2 or more concussions demonstrated significant lower GPA
Neurocognitive Testing

**Basis:** Test your responses while you’re “sober” as a baseline, then retest when you get injured and compare.

$\text{Head Injury}$

$\text{Pretest}$ $\xrightarrow{\text{Test}} \xrightarrow{\text{Compare}}$

$: Testing $5/per person + Admin fee, 30 people minimum. Internet based.

http://www.nationwidechildrens.org/neurocognitive-concussion-testing
Mouth Pieces: Do they work?

- "gum shields" Invented in 1890 by Woolf Krause to protect boxers from lip lacerations
- Thought to prevent concussions and spinal injuries
- Based on two prominent articles: Stenger et al. and Hickey et al.

In short:

Wearing a mouthguard hasn’t been shown to prevent concussions.. but it is conceivable that it prevents dental and gum injuries.
Helmets: Do they work?

(Compared to naked skull)

- Reduce risk of skull fracture by 60-70%
- Reduce risk of FOCAL brain contusion by 70-80%
- Reduce risk of traumatic TBI by only 20%, worst with most popular helmets
- Rotational Forces = Bad!!!!!
“We’ve represented several Minnesota workers who have suffered traumatic brain injuries, including post concussive syndrome following a work-related concussion.”

“A police officer who was shot in the head with a rubber bullet during training.”

“Claimant, a teacher, had an accepted claim for a concussion. The insurer awarded her $35,000 in permanent impairment in a notice of Closure. We appealed that notice securing an additional $75,000 in permanent disability benefits.”

“Claimant, a telephone company employee, suffered injuries in a work related motor vehicle accident. The workers compensation insurer denied medical treatment for “post concussive syndrome”. We took this claim to hearing and won, assuring claimant’s continued benefits for her headaches, dizziness, and vision problems.”
Major causes of Traumatic Brain Injury

- Falls: 29%
- Struck By... (inc. Sports): 21%
- Motor Vehicle Accidents: 19%
- Assault: 11%
- Other: 20%
Pre-Existing Injuries

- Severe (2,868)
- Moderate (23,319)
- Not Classifiable (19,958)
- Penetrating

287,861 DOD Head Injury Totals 2000-2013
(Defense and Veterans Brain Injury Center Nov 5, 2013)

Mild (237,360)
Challenges

• Training cost money.
• Maximize training for students
• Officers will WANT to train, You have to hold them back
• Rest enough that they recover
• Ensure no other head injuries: already unstable and weak
• Absolute NO TRAINING = Send Home?
• How "Trained Monkey" do you get?
Working with Head Injury

- Prior injury
  - If greater than 6 months then no added restrictions
  - If less than 6 months you must assume cumulative effects of injury

- How much do you restrict activity if there has been a prior injury?
  - If its seen or reported
    - Take action
    - No training that day
    - Rest
  - What is the risk of subsequent head trauma
  - Document it

- How much to train versus how much time out
- Time is $$$$$
- If you over restrict the word will get out
- Instructors can reinforce and modify lesson plans
Training Environment

Causes and Prevention
Common causes during training

Dynamic drills

- Arresting technique, bull in the ring, boxing, grappling, takedowns, baton training
- Most common cause: Head strikes from baton strikes, punches to the head, body slams
- Simunition training
- Non-training related – basketball, soccer, non-supervised off-duty training, etc.
The law enforcement patient

- Personality: I can work through this, I WANT to be active... I WANT to go out there, My team depends on me.

- "They’ll look down on me, look at me as weak."

- Management will think I’m not doing my part.

- Is this the culture in your workplace? Correct this mind-set from the top down.

- Is there a prior traumatic event? Military? MVA?

- The patient can not be trusted to think clearly after a TBI.

**REMEMBER: You can’t reason with a head injury patient!**
Prevention

- Lesson Plan Adherence
- Properly trained instructors
- Training-site safety officers
- Proper role player instructions and strict protocol adherence.
- Prevent head strikes in training
- Level of force: 50%-100%? Can you really gauge this?
• They’re happening daily
• Under reported!
• Why not?
• Warrior complex
• Fear of being sent home
• Fear of losing job
• Issue of accountability.
• Workplace/training culture.
• Lack of medical team oversight.

“But we don’t have any concussions”
Recognition

- The Health Screening
- Prior head trauma: past medical records are very helpful
- How long ago
- How bad
- Are they Omitting anything? (Intentional or Deliberate)

During training
Did you see it?
Did you not see it but was self reported (Basketball, etc.)
Is it really a head injury vs. dehydration?
What to look for? What do students have to know?

- If it is recognized then what do you do about it?
- Legal Document
One impediment: "Are they faking it?"

Patient comes in.. tell them to “go home and relax”.
An hour later you find them in the office on the computer… “this isn’t home and isn’t relaxing”
“But I don’t want to be seen as weak or slacking. “
Two days later from management: “ Are they faking it to go home?”

• Trust your medical team to make the call
• They’ve seen slackers before. They’re not going to document someone faking Nystagmus, or memory impediment!!!
• If you’re worried about them faking a TBI you have bigger issues.
• Sick Leave? Workers Comp? Financial Factors?
Who’s providing your medical coverage?

- Athletic Trainers
- Physicians
- Others?
- Intramural sports coverage?
Managements Role

• Know the parameters of the Dynamic drills-teach the task

• Trained Instructors

• Good Safety Plan and Safety Officer

• Well trained Role Players

• Good Medical Team
Long Term Effects

• Job performance issues?

• Personality changes?

• Depression?
Key points

- Good safety plan
- Proper training for all
- Good medical team support
- Train smarter
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