

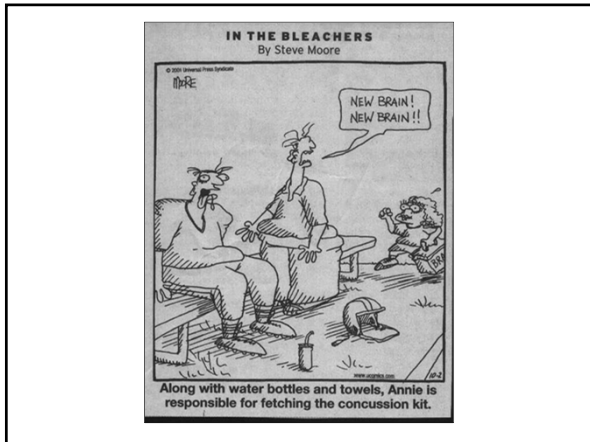
Concussions
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Disclosure

- I have no disclosures or financial relationships

Learning Objectives

- Diagnosis of Concussions
- Evaluation of the athlete
- Concussion Symptoms
- Return to Play
- Injury Prevention



Definition

- Caused by a direct blow to the head, face, neck or a blow elsewhere on the body with an impulsive force transmitted to the head
- Results in the rapid onset of short-lived impairment of neurological function that resolves spontaneously. In some cases, symptoms may evolve over minutes to hours.
- May result in neuro-pathologic changes

- Acute clinical symptoms reflect a functional disturbance not a structural injury
- Results in a graded set of clinical syndromes which may or may not include LOC
- Typically associated with normal structural neuro-imaging studies
- Resolution of clinical and cognitive symptoms typically follow a sequential course
- In some cases, symptoms may be prolonged

Diagnosis

- Clinical symptoms
- Physical signs
- Cognitive impairment
- Neurobehavioral changes
- Sleep disturbance
- Detailed concussion history

Suspected diagnosis includes 1 or more

- Symptoms
 - Somatic – headache
 - Cognitive – feeling foggy
 - Emotional – lability
- Physical Signs
 - Loss of Consciousness
 - Amnesia
 - Neurological deficit

- Balance Impairment
 - Gait unsteadiness
- Behavioral Changes
 - Irritability
- Cognitive Impairment
 - Slowed reaction times
 - Concentration disturbances
- Sleep/Wake Disturbance
 - Insomnia
 - Somnolence
 - Drowsiness

Acute Evaluation Sideline or On-field

- Evaluation by a physician or other licensed health care provider
- Use standard emergency management protocols and excluding cervical spine injury
- If no health care provider is available, player should be removed from practice or play and have an urgent referral to a physician

- Concussion assessment with SCAT 5, IMPACT, HEAD'S UP or other sideline assessment tools
- Do not leave to player alone after the injury
- Monitor with serial exams for deterioration in over the initial few hours
- **ANY PLAYER WITH SUSPECTED CONCUSSION SHOULD NOT RETURN TO PLAY ON THE DAY OF INJURY**

Evaluation in ED or Office

- May be the first contact with the athlete after the injury
- Comprehensive history
- Detailed neurological exam including mental status, cognitive functioning, sleep/wake disturbance, ocular function, vestibular function, gait and balance
- Clinical status whether improved or worse since the time of the injury
- If worse, may need to rule out severe brain injury or structural abnormality with brain imaging

Clinical Assessment

- Neuro-cognitive –verbal memory, visual memory, reaction time, processing speed summary scores
- Physical Exertion
- Symptoms – headache, dizziness, nausea, concentration, sleep problems
- Vestibular – dizziness, fogginess, fatigue, motion discomfort, anxiety, irritability, impaired balance, environmental sensitivity

Recovery

- Symptoms: 5-14 days
- Cognitive: 7-21 days
- Males recover quicker than females
- Adults recover quicker than kids
- Average recovery: 1-4 weeks
- Back to baseline
 - 40% in 1 week
 - 60% in 2 weeks
 - 80% in 3 weeks
 - 90% in 4 weeks

Post-concussion Symptoms

- 20% take > 3 weeks to recover
- Symptoms
 - Cognitive
 - Emotional
 - Sleep Disturbance
 - Physical-Migraine
- If all 4, it will take longer to recover
- Treatment based on symptoms

- Cognitive
 - Attention Problems
 - Memory dysfunction
 - “Fogginess”
 - Fatigue
 - Cognitive slowing
- Emotional
 - More emotional
 - Sadness
 - Nervousness
 - Irritability

- Sleep Disturbance
 - Difficulty falling asleep
 - Sleeping less than usual
- Physical-Migraine
 - Headaches
 - Visual problems
 - Dizziness
 - Noise/Light sensitivity
 - Nausea

- ### Return To Play
- Athletes should not return to play on same day of injury
 - No return to practice or games until all symptoms have resolved – old
 - Children and adolescents should not return to sport until they have successfully returned to school.

Return to School

- Daily activities at home do not give the athlete symptoms
 - Reading, texting, screen time
 - Start with 5-15 minutes
 - Gradually increase
- School activities
 - Homework, reading or other cognitive activities

- Return to school part time
 - Gradual introduction of school work
 - May do partial school days
 - Or increased breaks during the day
- Return to school full time
 - Gradual progression of school activities until a full day is tolerated

Return to Play

- After a brief rest during the acute phase (24-48 hours) after injury, patients can start to become gradually and progressively more active.
- They need to stay below their cognitive and physical symptom-exacerbation threshold
- Their activity should not bring on or worsen their symptoms
- They should avoid rigorous exercise while recovering
- The exact amount and duration of rest is not yet well defined

- Symptoms need to be gone for 24 hours before gradual return to play ???
- Should be at baseline, asymptomatic at rest
- Off acute medications
- Watch for pre-existing conditions
- Screen time – help or hinder?
- Watch for anxiety, depression
- Try to keep on routines

- ### Graduated Return to Play Protocol
- Step-wise progression
 - May proceed to next level if no recurrence of symptoms at the current level
 - Each step should take 24 hours
 - Takes approximately 1 week through full protocol once no symptoms at rest
 - If any symptoms return, patient should return to previous asymptomatic level
 - May try next level again after 24 hours
 - Return must be individualized to each athlete

- No activity x24-48 hours: physical and cognitive
- Light aerobic exercise: increase heart rate
 - Walking, swimming, running
 - Keep intensity <70%of maximum heart rate
 - No resistance training
- Sport specific exercise: add movement
 - Skating drills for hockey
 - Running drills in soccer
 - No head impact activities

- Non-contact training drills: exercise, coordination, and cognitive load
 - More complex training drills
 - May start progressive resistance training
- Full contact practice: restore confidence and assessment of functional skills by coaches
 - After medical clearance, participation in normal training activities
- RETURN TO PLAY: normal game play

- ### Injury Prevention
- Protective Equipment
 - Reduce impact forces to the brain, but these have not shown to decrease the incidence of concussions
 - Mouth guards: prevent dental and oro-facial trauma
 - Helmets: prevent skull fractures
 - Soccer head bands: doesn't decrease ball impact force for routine heading but may decreased risk of concussion with head to head contact
 - Set equipment standards
 - Improve equipment development: 5 star helmets
 - Risk Compensation: adoption of more dangerous techniques

- Rule changes
 - Long history in NCAA and CIF to decrease brain injury
 - Set play and practice standards
 - Limiting high school football contact practices to 2x's/week
 - Ideally 30 minutes/day and 60-90 minutes/week
 - No contact on consecutive days
 - Decreases head impact exposure by 42% over the season but varies by position
 - Majority of concussions occur during practice
 - Decrease checking in pee wee hockey

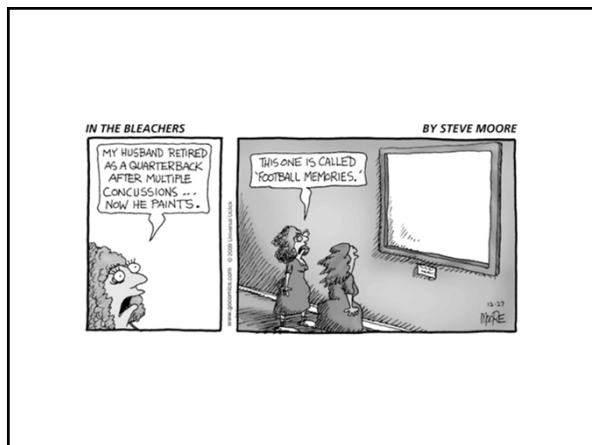
- Improve Techniques
 - Defining contact: air, bags, wrap style, take down, live action
 - What age do you allow contact
 - Who teaches contact
 - Teaching and enforce rules of proper tackling, checking
 - Heads up football: decrease head impacts by about 40%
 - Zero tolerance for illegal, head first hits

- ### Reporting of Injuries
- Because of state laws, media, awareness, education (parents, athletes, coaches), there has been improved reporting
 - Could do better – 30% not reporting
 - Change culture of reporting
 - Athletes don't want to disappoint coaches, peers, parents

- Have trainers or side line medical professionals present to do the reporting
- Establish a national surveillance system that includes high school, club teams and college levels
- Establish evidence based guidelines
- Set up longitudinal studies

Conclusions

- Promote education and awareness of concussions
- Remove athletes from play immediately for suspected concussion
- No return to play on the same day as the concussion
- No return to play for brief period (24-48 hours) after acute injury
- No return without medical clearance



Appendix

- Head's Up: CDC
- SCAT 5
- Child SCAT 5

This is the first page of a cognitive screening form. It includes a title bar, a patient information section with fields for Name, DOB, Address, and Phone. The main section is titled 'STEP 3: COGNITIVE SCREENING' and contains several sub-sections: 'IMMEDIATE MEMORY' with a 3-item list, 'CONCENTRATION' with a 'DIGITS BACKWARDS' test, and 'DAYS IN REVERSE ORDER'. Each section has a table for recording scores. At the bottom, there is a 'Scoring' section with instructions and a small table.

This is the second page of the cognitive screening form. It features 'STEP 4: NEUROLOGICAL SCREEN' with a table for recording observations on various items. Below this is 'BALANCE EXAMINATION' with a table for recording scores on different balance tests. To the right is 'STEP 5: DELAYED RECALL' with a table for recording scores on a list of items. A large black box at the bottom contains the following text: 'SCORING ON THE CHILD SCATS SHOULD NOT BE USED AS A STANDARD METHOD TO DETERMINE CONCUSSION, MEASURE RECOVERY OR MAKE DECISIONS ABOUT AN ATHLETE'S READINESS TO RETURN TO COMPETITION AFTER CONCUSSION.'

This is the third page of the cognitive screening form. It starts with 'CLINICAL NOTES' followed by several horizontal lines for writing. Below this is a section titled 'Conclusion' with a 'Conclusion history advice for the child and parents/coaches' section containing a list of instructions. To the right is a 'Conclusion' section with fields for 'Child's phone number', 'Athlete's name', 'Date/Time of Injury', 'Date/Time of assessment', 'Injury Location', and 'Sport/Activity'. At the bottom right, there is a 'Contact Details or Stamp' area.

