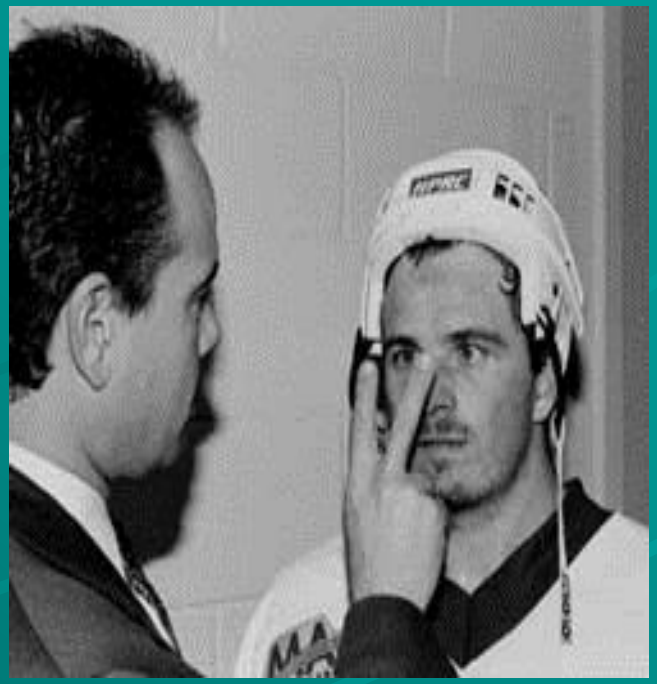
Concussion Assessments & Westchester Concussion Task Force Update

Mark Herceg, PhD
Commissioner, Westchester County Dept of Community Mental Health

Chair, Westchester County Concussion Task Force

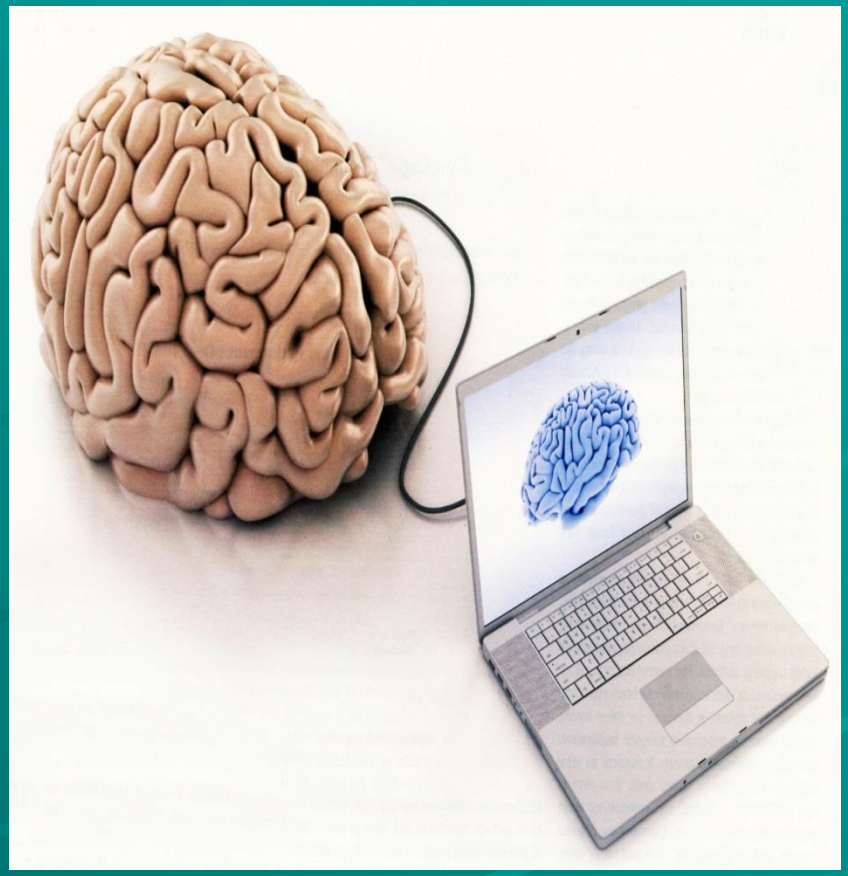
Pre-Season to Post-Injury

- Medical Exam/Physical
- Baseline
- Sideline
- Post-concussion
- When asymptomatic then RTP & RTL
- If symptoms remain, treatment



Computerized Assessments

- Neurocognitive concussion mgmt starts with a proper and valid baseline.
- Brief computerized neurocognitive screen have become norm and quite an indu$try.



Computerized Assessments

CNS Vital Signs®

ImPACT™

axon SPORTS
POWERED BY COGSTATE

Neuropsychological Assessment of Concussion

Echemendia et al (2013 Brit Journal of Clin Med) conducted a 12 year lit review of 2600 articles/studies to assess:

- the advantages/disadvantages of different neuropsychological assessment modalities
- the evidence for/against baseline/post-injury testing
- the role of psychological factors
- advances in the neuropsychological assessment of children
- the appropriate administration/interpretation of neuropsych tests.

Findings

- Computerized tests are useful in the evaluation & management of concussion
- Brief cognitive tools are NOT substitutes for formal neuropsychological assessment
- Insufficient evidence to recommend the widespread routine use of baseline neuropsychological testing
- Psychological factors may complicate and prolong recovery from concussion in some athletes
- Neuropsychologists play an important role within the context of a multifaceted-multimodal approach to manage sports-related concussions

ImPACT

- Measures athletes symptoms (mood, sleep, dizziness, HA)
- Verbal/Visual memory, PS and RT
- Assists clinicians and athletic trainers in making RTP decisions- NOT for RTL
- Produces a summary report of test results
- Automatically stores data from repeat testing
- Can be administered online for individuals or groups
- Approximately 20 mins

Issues with Computerized Assessment

- Many tests now available on-line at home.
- Students misunderstand questions without guidance.
- Assessments do not take into account potential emotional, personality or learning issues.
- Computerized testing ≠ thoroughness yet used for 504/IEP.
- Rarely do schools/programs consult with NP for baseline or post injury interpretation.
- Test setting/supervision.

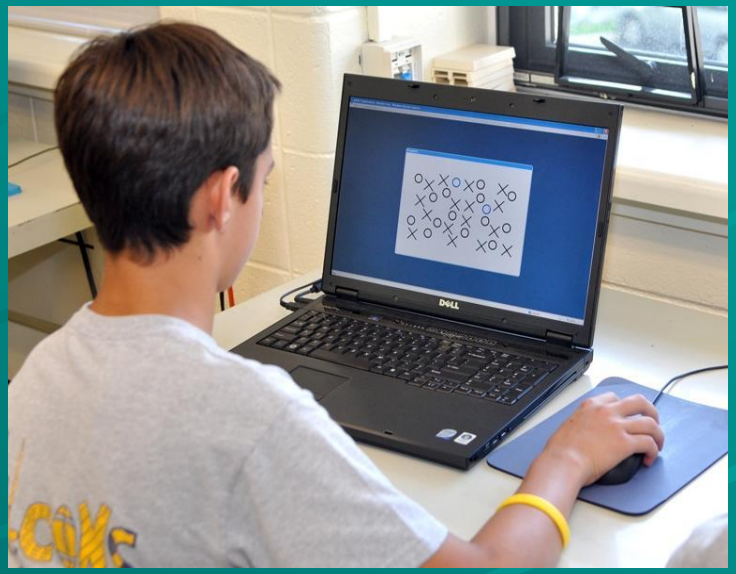
Study 1:Age and Test Setting Affect the Prevalence of Invalid Baseline Scores on Neurocognitive Tests

Lichtenstein, et al *American Journal of Sports Medicine* (2014) 42: 479

- Found that AGE and TEST SETTING affect the prevalence of invalid baseline ImPACT scores.

- Younger students, ages 10-12, produced significantly more invalid results (17/244) than older ones, ages 13-18 (7/258)

- Younger students tested in larger groups significantly more likely to produce invalid results(11.9%) than in smaller groups (5.4%)



Study 2: Group Vs Individual Administration Affects Baseline NeurocognitiveTest Performance

Scolaro-Moser, et al, *American Journal of Sports Medicine* (2011) 39: 2325

- 164 HS athletes completed baseline in group setting (computer lab)

- 167 completed individual baselines in a private office

Athletes in the group setting scored significantly lower on Verbal Memory, Visual Memory, Motor Processing Speed, and Reaction Time.

Invalid baselines higher in group (14 out of 164) than individual (1 out of 167).

Study 3: The Relation Between Testing Environment and Baseline Performance in Child and Adolescent Assessment

Vaughan, Gerst, Sady, Newman & Gioia
American Journal of Sports Medicine online April 30, 2014

- **939** participants (aged 5-18 years),
  - 313 tested individually and 626 tested in a group setting.

- **NO** significant differences were found between individual and group testing settings

- In younger children (aged 5-12 years), higher rates of invalid performance in the group setting with ADHD disorder compared with those without, although there no differences in the individual setting.

- Children given a baseline assessment in a group setting performed no differently than children tested individually when standardized administration procedures were used by trained test administrators.

Recommended Test Conditions

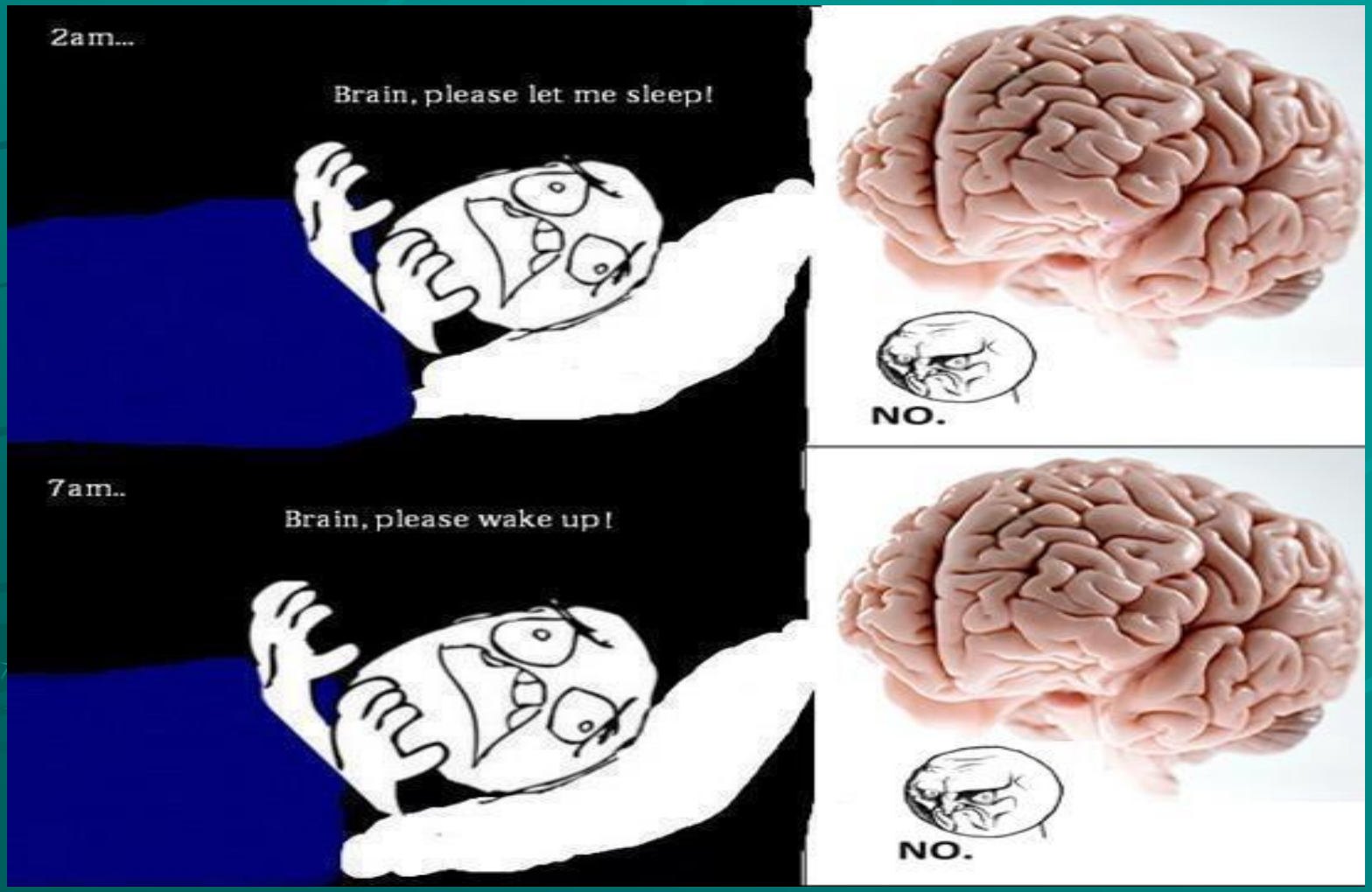
Vaughan et al.

- Testing must be conducted in a room with minimal distractions.
- Make every effort to minimize distractions, by keeping doors closed, facing computers away from windows, and providing adequate spacing between computers.
- The use of cardboard privacy carrels (3-sided, 17 inches high) placed around each computer is recommended in order to create a more private, distraction-free environment.
- Staff must be trained in standardized test administration. In best case scenario, consult with a neuropsychologist.
- The examiners must be present throughout the entirety of the test sessions.

Recommended Testing Conditions cont'd

- Examiners verbally read instructions & carefully monitor children during test-taking.
- Test instructions should be scripted and consistent
- Group size: In group settings, testing should be in groups no greater than **15** individuals, with smaller group sizes depending on age.
- The child-to-examiner ratio in group testing environments should be capped at 6-to-1, often with 2 or more proctors for 8 to 12 kids.
- Younger children ages 5 or 6 should receive 1-to-1 or 2-to-1 instruction.
- Instructions should be quietly read to younger children, or those who exhibit any difficulty understanding task instructions.

Sleep and Testing



Recent Study: Relationship b/w Short Sleep Duration & Preseason Concussion Testing

Silverberg, et al *Clinical Journal of Sports Medicine* (online Aug 2015)

- Hypothesis: adolescents who slept fewer hours the night before would report more symptoms & perform more poorly than students who had a full night sleep.

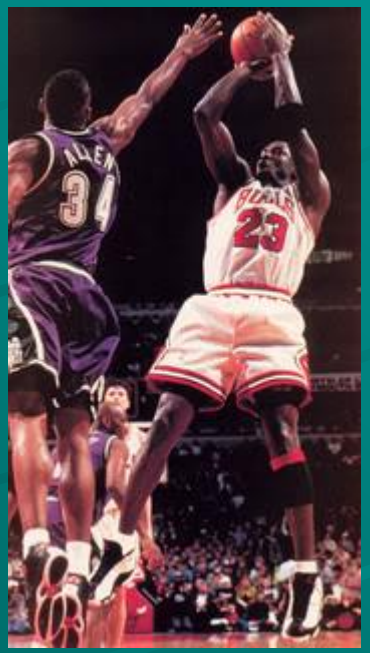
- 2928 student athletes from Maine, USA, b/w 13 and 18 years completed preseason testing.

- Participants with developmental problems, a history of treatment for neurological or psychiatric problems, recent concussion, or 3 or more prior concussions were excluded

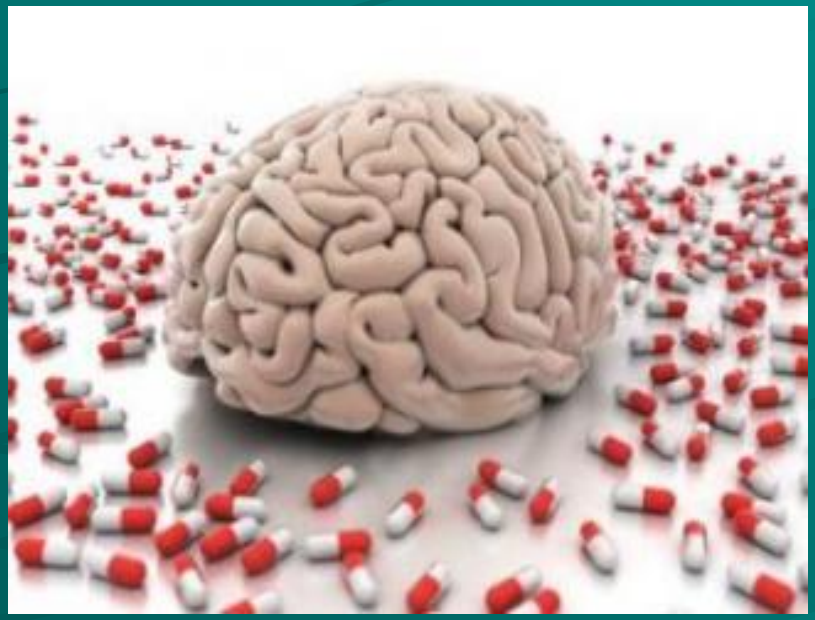
Results of Short Sleep Duration Study

- Sleep was not related to any ImPACT cognitive composite score.
- But there were gender effects on sleep duration on the Post-Concussion Symptom Scale
- The effect of sleep duration on symptom reporting was more pronounced in girls who may be more vulnerable to experiencing and reporting symptoms following insufficient sleep

Pre-Existing Personality & Emotional Factors



The Effects of Medication and Psychiatric Illness on Baseline Testing



Yengo-Kahn, Zuckerman, & Solomon

N*eurosurgery* Aug 2015; 62,Suppl 1

Results

- From 2007 to 2012, over 7000 athletes underwent pre-participation baseline neurocognitive testing using ImPACT
- Examined students who were taking medications, and if those meds were stimulants or antidepressants and students depressed w/o meds
- Athletes using stimulants displayed **significantly** lower visual motor speed scores and slower reaction times than matched non-users
- Antidepressant users displayed **significantly** faster reaction times
- Hx of depression/anxiety (no meds) displayed significantly lower visual memory and higher symptom scores

Study: Relationship Between Psychological Distress & Baseline Sports-Related Concussion Testing

Bailey, et al *Clinical Journal of Sport Medicine* 2010 Jul;20(4):272-7

<u>47 college football players</u>

Concussion Resolution Index
PAI

<u>Sig correlations among CRI scores and</u>

Aspects of somatic concern
Depression
Anxiety
Substance abuse
Suicidal ideation

What does that mean?

- Higher PAI symptom endorsement associated with poorer CRI performance
- Psychological distress had a moderate to large effect on baseline concussion testing
- Findings heighten the clinical importance of screening for psychological distress during baseline and post-injury concussion evaluations
- If the brain is complex, how can a 20 min test accurately capture everything?

Sideline Evaluation

- As important as the baseline is, a sideline assessment RIGHT AFTER a concussion is sustained perhaps even more vital.
- Provides ***on the spot*** information.
- Can be computerized (tablet) or paper and pencil.
- Most universally accepted test is SCAT3 for ages 13 and over or CHILD SCAT 3 for children for ages 5-12.

"Remove from Game" Sideline Assessments

- There is NO single test for concussion.
- It is misleading when someone says they "passed" a concussion test.
- U of Florida 2014 found:

  KD w SAC & BESS: 100% accurate
- Diagnosis of concussions remains a clinical process- tests are components of that process.

Does Gender matter?

Soccer:

A 2007 JAT found that the concussion rate for girls was 68 percent higher than boys

A 2011 study found that the concussion rate for girls in HS soccer (0.35 per 1000 participations by an athlete in a practice or competition or athlete exposures (AEs) was **double** that of boys (.017 per 1000 AEs)

A 2013 study by Safe Kids Worldwide and the Consumer Product Safety Commission Found that girls in soccer were more likely than boys to be seen in hospital ER's as a proportion of all sports-related injuries.

Does Gender matter?

- Basketball:
  2007 study Girls Rates 3x higher than boys

  2011 study concussion rate for girls was 1.7 times higher than for boys.

  2013 study 11.5% of injuries seen in girls basketball were concussions compared to 7.2% for boys.

- Field Hockey:
  18.7% of girls seen in ED are seen for concussions, compared to 15.6% of boy lacrosse players.

Resilience is Associated with Outcome in mTBI/Concussion

Silverberg, et al *Journal of Neurotrauma* V 32, June 22, 2015

- Resilient individuals manifest adaptive behavior and are better able to recover from adversity.

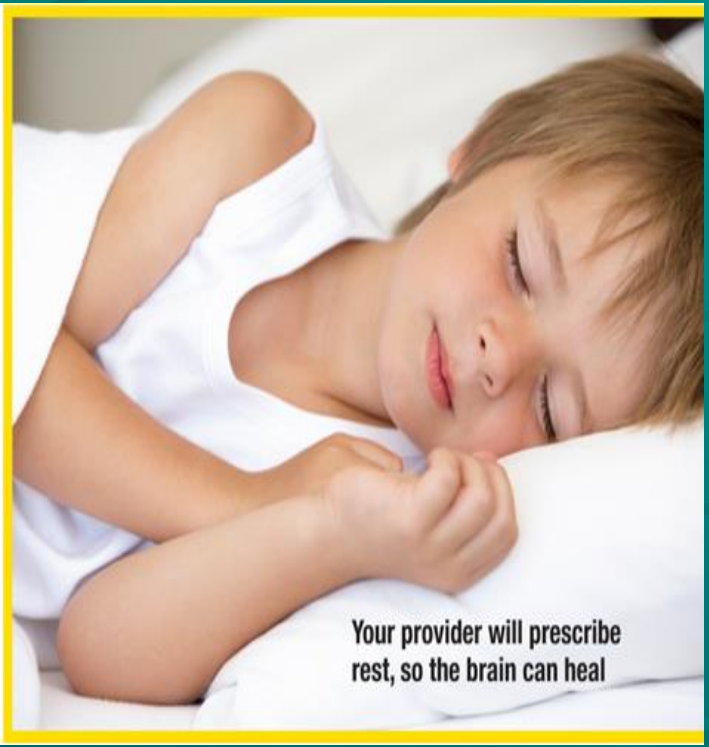
- Ind with mTBI (n=74) and orthopedic controls (n=39) completed the Resilience Scale at one, six, and 12 months after injury.

- Ind with mTBI and moderate-to-high resilience reported significantly fewer post-concussion symptoms, less fatigue, insomnia, traumatic stress, and depressive symptoms, and better quality of life, than those with low resilience.

Psychosocial Factors

- Time away from teammates
- Invisible injury
- Feelings of isolation can lead to depression
- Peer group reactions
- Pressure to return to the team
- Anxiety & academics
- Extended cognitive rest can increase anxiety
- Family pressure

To rest or not to rest



Programmed Physical Exertion in Recovery From Sports Concussion: A Randomized Pilot Study

Arthur Maerlender, et al *Developmental Neuropsychology*, online July 2015

- Twenty-eight recently concussed college athletes were recruited 2010–2013.
- Randomly assigned to either standard concussion recovery recommendations ("Standard": 12 females, 3 males), or prescribed daily physical exertion at a moderate level via bike riding ("Exertion": 8 females, 5 males).

Results

- During exertional challenge, the most frequently endorsed symptoms after riding were headache, dizziness, & fatigue.
- Symptoms after moderate exertion only occurred initially, but soon dissipated over the following rides.
- However, the amount of measured vigorous activity was related to recovery, with more exertion retarding recovery.
- This study provides initial evidence that starting exercise relatively early after injury, and that mild symptom increases should not interfere in recovery.

Interdisciplinary CMT
Irvington Model

- Certified Athletic Trainer
- School Physician
- Nurse
- Athletic Director
- Neuropsychologist

Interdisciplinary CMT
Irvington Model

- Baseline:
  - Medical/physical
  - Neurocognitive (ImPACT, KD, SAC)
  - Personality/behavior
- Sideline:
  - Neurocognitive (SAC,KD)
  - Physical (balance)
  - Medical/EMS (if necessary)
- Post Injury Mgmt:
  - Medical/physical
  - Neurocognitive
  - Personality/behavior

Why Safer Sports and Task Force

- Evaluate how districts and youth programs manage/address concussions.
- Ensure that the reporting of all concussions and any lasting symptoms happens from the field/playground, to parent, to ER, to health care professional, to the classroom, & beyond.
- NOT about singling out districts/programs that do this poorly, but also identifying ones that do it well.
- Despite every state having a concussion law, loop holes remain.

Task Force Members

- Pediatricians
- Pediatric Neurologist
- Pediatric Neurosurgeon
- Neuropsychologists
- Athletic Trainers
- Athletic Directors
- Parks & Rec
- Orthopedic Surgeon
- Physical Therapists
- Vestibular Therapists
- School Nurse
- Section 1 Safety
- BOCES staff
- Superintendents
- Westchester County Depts

Safer Sports and Task Force

Develop a standard protocol that includes:

1. Formation of a task force of stakeholders
2. Concussion education and training to coaches, athletic trainers, and athletes **AND** parents
3. Valid and comprehensive baseline assessment
4. Facilitation of **RTP & RTL** decisions with effective interdisciplinary treatment
5. Development and implementation of a concussion injury surveillance system.

What can be done in schools/youth sports

- Encourage students AND parents to take concussion ed class.
- Access to athletic trainers. How can we allow students to play contact sports without them?
- Establish uniformity in protocol, despite fact that concussions are individualized.
- Encourage schools/programs to have an formal , interdisciplinary concussion management team (CMT) that meets regularly.
- Address non-sports related or PE concussions in same manner.
- CMT can have a professional resource directory to give to parents.
- If ImPACT is all programs/schools do, missing important components.

What can providers and schools do together

- Promote education & not strike fear about sports.
- Despite good intentions, lack of collaboration/ communication.

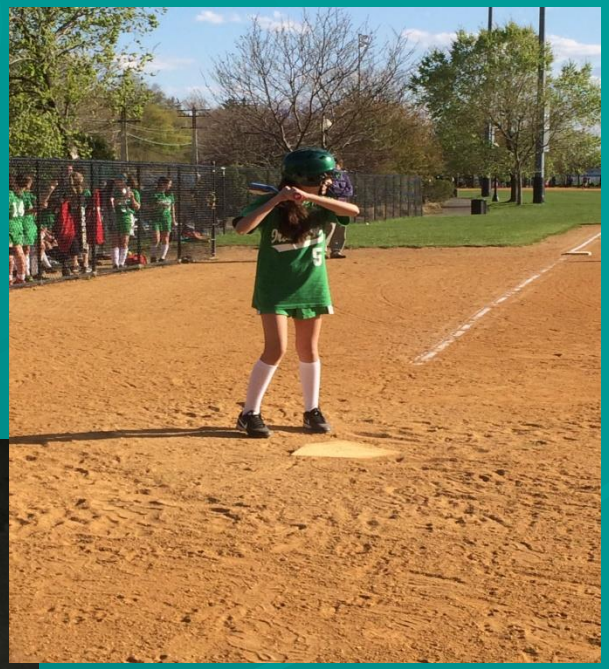
  Why? Because concussions are a hot topic and big indu$try.
- Not treat outside scope of expertise bc = harm to public.
- Provide appropriate referrals for specific symptoms.
- If not brain trained, encourage providers to attend conferences, obtain CE's, or become CBIS offered by BIANYS.
- Encourage students and their parents to document symptoms, triggers and progress.

Who should be involved in a students recovery from concussion?

- Student
- Parents
- Coaches
- Athletic Trainer
- Principal
- Superintendent
- Athletic Director

- School Nurse
- School Psychologist/Counselor
- School Physician
- Pediatrician/PCP/Neurologist
- Neuropsychologist
- Neuro-opthamalogist/optometrist
- Physical/Occupational Therapist

Final Thoughts



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WestchesterGov.com/SaferCommunities

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