HEAD FIRST IN THE CLASSROOM: RETURNING TO LEARN WITH A CONCUSSION

PRESENTER:
KIT VREELAND, ATC, MBA
DOCTORAL CANDIDATE
UNIVERSITY OF VERMONT

INTRODUCTION
Certified Athletic Trainer
Clinical Associate Professor
- UVM Dept. of Rehabilitation and Movement Science
- 70% Teaching, 30% Clinical
UVM Club Sports
- Men’s & Women’s Rugby
Educational Leadership and Policy Studies
- Doctoral Candidate (Ed.D.)
- “Exploring the effects of concussion on college students returning to academic demands.”

GOALS OF PRESENTATION
1) Review: What is a Concussion?

2) Presentation of the Current Literature:
- Healing Time of a Concussion
  - Current literature regarding healing
  - Lasting effects of concussion?
  - The effects of rest on concussion management
- Returning to Learn and Concussion Management
WHAT IS A CONCUSSION

“Concuss”: Latin – “shake violently”

Basic Pathophysiology:

*ENERGY CRISIS*

- Membranes get stretched
- Potassium leaks out of neuron
- Calcium leaks into cells
- Reduced cerebral blood flow


WHAT IS A CONCUSSION

Signs & Symptoms occur due to:

- Neurometabolic crisis
- Depressed metabolism
- Cell death
- Impaired neural connectivity

... among others

WHAT IS A CONCUSSION

Symptoms are generally organized into four categories*:

PHYSICAL SYMPTOMS  EMOTIONALITY

COGNITIVE SYMPTOMS  SLEEP DISTURBANCE

*Collins et al. presents a new model of clinical trajectories – to be discussed later*
HEALING TIME OF A CONCUSSION

- Harmon et al. (2013)
  - 80-90% report symptom resolution within 7-10 days

- Iverson et al. (2006)
  - 10 days, 37% still showed NP deficits

- Zuckerman et al. (2012)
  - Average return to NP baseline (18-22 y/o):
    - Verbal memory: 4.7 days
    - Visual memory: 4.7 days
    - Reaction time: 5.1 days
    - Symptom scale items: 6.1 days

- Belanger & Vanderplas (2005); Broglie & Puetz (2008)
  - Meta-analysis studies
    - Significant decrements in neurocognitive performance immediately post-injury
    - Impairments significant less @ 10-14 days

- Majerske et al. (2008)
  - High levels of exertion → worse NP outcomes

- Maugans et al. (2011)
  - 12 Participants, 11-15 y/o
  - Full NP resolution by 30 days, but 36% still had dec. cerebral BF

HOW DO CONCUSSIONS HEAL?!

REST! *?
LASTING EFFECTS OF A CONCUSSION?
Growing body of literature that speculates lasting deficits

Czerniak et al. (2014)
• Participants who previously sustained a concussion, but was considered healed, had to work harder @ rest than non-concussed controls.

LASTING EFFECTS OF A CONCUSSION?

Pontifex et al. (2012)
• Participants who previously sustained a concussion but were considered healed (measured by NP testing) had extended deficits in attention vigilance
• Multiple concussion had greater deficits

LASTING EFFECTS OF A CONCUSSION?

Vargas et al. (2015)
• Collegiate athletes who suffer a concussion may have a higher risk of depression symptoms, prolonging recovery and adversely affecting quality of life.
• Reporting of depressive symptoms that are of greater clinical importance
LASTING EFFECTS OF A CONCUSSION?

Kostyun et al. (2014)
• Retrospective: Participants who reported disturbances to sleep had worse outcomes in NP testing and symptoms
  • < 7 hours sleep: ↑ symptom scores
  • > 9 hours sleep: worse visual memory, visual motor speed, reaction time

Mihalik et al. (2013)
• Low sleep quantity resulted in poorer performance on NP testing

LASTING EFFECTS OF A CONCUSSION?
Recent literature is suggesting potential long-term deficits after suffering from a concussion
• May not be identifiable or measureable with our traditional tools!

Implications?
• Identifying athletes at risk
• Managing patients appropriately – RTP (Return to Play)
• Effects on academic efficacy
• Managing students – RTL (Return to Learn)

STUDENT ATHLETES WITH CONCUSSION
When and how should a student return to learn?

<table>
<thead>
<tr>
<th>Academics demands</th>
<th>Prolonging symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPA</td>
<td>Cognitive impairment</td>
</tr>
<tr>
<td>Scholarships</td>
<td>Other ongoing deficits &amp; challenges</td>
</tr>
</tbody>
</table>

△

Literature regarding "Return to Play" is extensive. Paucity of high impact research on "Return to Learn".
RETURN TO LEARN
Harmon et al. (2013); Popoli et al. (2014)
• No uniform policies or procedures for returning a student to academic studies

Halstead et al. (2013); McGrath (2010)
• Balance between cognitive exertion and rest

REST FROM COGNITIVE ACTIVITY?
COGNITIVE & PHYSICAL REST ACUTELY 1-2 days.
***Based on expert opinion and consensus

Schneider et al. (2013)
• Meta-analysis: Sparse high quality research on effects of rest

Brown et al. (2014)
• "Increased cognitive activity is associated with longer recovery" (p. e299)

REST FROM COGNITIVE ACTIVITY?
Moser et al. (2012)
• Rest resulted in significant improvement on NP testing and symptom scores, even when prescribed weeks after the acute event of the concussion.
  • *Significant limitations to study
REST FROM COGNITIVE ACTIVITY?

Thomas et al. (2015)
- 5 days of prescribed strict rest resulted in no difference on ImPACT or BESS outcome compared to traditional 1-2 days rest
- 5 days strict rest group reported more symptoms over course of study ($P < .03$)
- 50% of strict rest group took 3 days longer for symptom resolution

CURRENT CONSENSUS GUIDELINES

American Academy of Pediatrics
- Return to school when 30-45min cognitive activity tolerated
- Rest periods
- Remove from aggravating classes

NCAA Guidelines
- No classroom ≥ 1 day
- Until 30-45min cognitive activity can be tolerated w/o Sx
- Step-wise RTL: 30-45min followed by ≥ 15min rest
- Academic adjustments and accommodations

RTL: IDENTIFYING CLINICAL TRAJECTORIES

Collins et al. (2014)
- Vestibular
- Ocular-motor
- Cognitive/Fatigue* (global factor first 7 days)
- Anxiety/Mood
- Cervical
- Post-Traumatic Migraine
- Identify trajectory after 7 days
  - Develop individualized treatment and rehabilitation
RETURN TO LEARN & CONCUSSION MANAGEMENT

Education of Teachers, Parents, Students

Team approach
• Student, physician, parent, teachers, athletic trainer, vestibular/physical therapist, school counselor, school nurse, principal, etc.

RETURN TO LEARN & CONCUSSION MANAGEMENT

Behavioral regulation
• Sleep/wake times
• Diet & hydration
• Exercise (daily walk)?
• Calm/stress free environment

"Brain exercise”
• Meditation & mindfulness
• Learning/playing musical instrument
• Reading?

RETURN TO LEARN & CONCUSSION MANAGEMENT

Academic accommodations & adjustments
“Instructional modifications”
• Identify the triggers for symptoms

Vestibular
• Small exposure to busy environment
• No cafeteria, chorus, band, etc.
• Leave class early – stay out of busy halls
• Work in library, teacher office
• Sit in front of bus/car
RETURN TO LEARN & CONCUSSION MANAGEMENT

Ocular motor

• Reduce strain on ocular system
• Audiobooks/reduce reading
• Frequent breaks from screens
• No flashing/constant motion screens
• Baseball hat?, head down on desk
• Vision therapy specialist?

RETURN TO LEARN & CONCUSSION MANAGEMENT

Anxiety/Mood

• Decrease arousal level
• Return fully to school
• Regulation & structure!
• Supervised physical exertion
• Track progress
• Psychotherapy?

RETURN TO LEARN & CONCUSSION MANAGEMENT

Post-Traumatic Migraine

• Increased cardiovascular activity, supervised
• Regulation
• Pharmacologic intervention

Cognitive/Fatigue

• Extra time for exams & assignments
• Head down on desk
• Breaks during class
• “Clear the desk”