Concussion: The School’s Active Role in Recovery

Catherine McGill, Psy.D.
Pediatric Neuropsychologist
Division of Pediatric Neuropsychology
Children’s National Health System
Assistant Professor Departments of Pediatrics & Psychiatry and Behavioral Sciences
George Washington University School of Medicine
Agenda

- Concussion 101: What is it?
- Effects of Concussion on School Learning & Performance
- Effects of School Learning & Performance on Concussion Recovery
- Strategies for Supporting Recovery
  - Key Aspects of a School Concussion Policy
- Q&A
What is a concussion?

- A bump, blow or jolt to the head or body that causes the brain to move rapidly back & forth
- Causes:
  - stretching of brain > chemical changes & cell damage
  - Causes change in how brain functions and produces clinical signs & symptoms
- Once these changes occur, brain is more vulnerable to further injury and sensitive to increased stress
Neurometabolic Cascade Following Traumatic Brain Injury

(Giza & Hovda, 2001)

(UCLA Brain Injury Research Center)
So you get the science... Now here’s what you really need to know:

Concussion Recognition and Response:
It’s a TEAM Sport

(and YOU are on the team)
Concussion Recognition

“Ị SUSPECT!”

1 Blow / Force to Head / Body

+ Change in Function / Behavior / Performance

2

<table>
<thead>
<tr>
<th>Post-Concussion Signs &amp; Symptoms</th>
<th>Physical</th>
<th>Cognitive</th>
<th>Emotional</th>
<th>Sleep</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headache</td>
<td>Concentrate</td>
<td>Irritability</td>
<td>More</td>
<td></td>
</tr>
<tr>
<td>Fatigue</td>
<td>Memory</td>
<td>Emotional</td>
<td>Less</td>
<td></td>
</tr>
<tr>
<td>Balance/ Dizziness</td>
<td>Speed of Thinking</td>
<td>control</td>
<td>Cannot</td>
<td></td>
</tr>
</tbody>
</table>

"Ị SUSPECT!"
Signs and Symptoms of a Concussion

A concussion is caused by a bump, blow, or jolt to the head. Concussions can also occur from a fall or when the body is hit by or runs into something. Even when there is no head bump, the head can be seriously injured. Be alert to any of the following signs and symptoms.

What can school professionals do?

A. Assess the situation
B. Be alert for signs and symptoms
C. Contact a health-care professional

Signs Observed by School Professionals

- Assess numbing or ‘pressure’
- Difficulty thinking clearly
- Blurred vision
- Headache or ‘pressure’
- Dizziness or balance problems
- Sensitivity to light or sound
- Irritability
- Mood swings
- Sudden or unusual behavior
- Poor concentration
- Confusion
- Fatigue
- Memory loss
- Stiff neck
- Slurred speech
- Leaking or pressing

Signs Reported by the Student

- Mood changes
- Having trouble sleeping
- Leaking or pressing
- Stiff neck
- Slurred speech
- Confusion
- Poor concentration
- Memory loss
- Fatigue
- Headache or ‘pressure’
- Dizziness or balance problems
- Sensitivity to light or sound
- Leaking or pressing

Contact a health-care professional for advice and support.

www.cdc.gov/concussion
Electronic Clipboard...

Concussion Recognition & Response App
Signs You May See (Acutely)

- Appears dazed or stunned
- Is confused about events
- Answers questions slowly
- Repeats questions
- Can’t recall events *prior* to the hit, bump, or fall
- Can’t recall events *after* the hit, bump, or fall
- Loses consciousness (even briefly)
- Shows behavior or personality changes
# Symptoms Reported by the Student

## Thinking/Remembering:
- Difficulty thinking clearly
- Difficulty concentrating or remembering
- Feeling more slowed down
- Feeling sluggish, hazy, foggy, or groggy

## Emotional:
- Irritable
- Sad
- More emotional than usual
- Nervous

## Physical:
- Headache or “pressure” in head
- Nausea or vomiting
- Balance problems or dizziness
- Fatigue or feeling tired
- Blurry or double vision
- Sensitivity to light or noise
- Numbness or tingling
- Does not “feel right”

## Sleep*:
- Drowsy
- Sleeps less than usual
- Sleeps more than usual
- Has trouble falling asleep

*Only ask about sleep symptoms if the injury occurred on a prior day.
Four Corners Approach to Concussion Care

Child/ Teen
(Student, Athlete, Son/Daughter, Friend)

Family

Medical Systems
Pre-Hospital (EMS)
Emergency
Urgent
Primary Care
Specialty Care

Certified Athletic Trainer

School
Administrators
Teachers
School Nurse/
Counselor
Psychologist

Certified Athletic Trainer

Certified Athletic Trainer

Athletic/
Recreational
Administrators
Coaches
Officials
Parents
Teammates
School Return & Support
"You can't educate a child who isn't healthy, and you can't keep a child healthy who isn't educated."

Joycelyn Elders
Effect of Concussion on School Learning & Performance

Effect of School Learning & Performance on Concussion Recovery
School Kid’s Major “Job”

- **New Learning/Acquiring** Knowledge
  - Academic
  - Social
- **Practicing** incompletely learned knowledge
- Mental/Cognitive **exertion** is essential to new learning/practice
School professionals should watch for students who show increased problems

- Paying attention
- Problems remembering or learning new information
- Inappropriate or impulsive behavior during class
- Greater irritability, less ability to cope with stress
- Difficulty organizing tasks
- Fatigue in class
- Onset of or worsening headaches
Concussion’s Effects on School Learning & Performance

- 80 students with concussions
- “Which specific types of problems are you experiencing in school?”
- Students reported an average of 4 problems below.
  - Headaches interfering 71.3%
  - Can’t pay attn in class 62.5%
  - HW taking much longer 59.5%
  - Difficulty studying for test/quiz 51.9%
  - Too tired 50.6%
  - Diffic understanding material 44.0%
  - Difficulty taking notes 28.8%
Concussion’s Effects on School Learning & Performance

“Which classes are you having the most trouble with?”

(Percent reporting trouble in class)

<table>
<thead>
<tr>
<th>Class</th>
<th>Parent</th>
<th>Student</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math</td>
<td>60.3%</td>
<td>73.7%</td>
</tr>
<tr>
<td>Reading/LA</td>
<td>38.1%</td>
<td>46.1%</td>
</tr>
<tr>
<td>Science</td>
<td>38.1%</td>
<td>47.4%</td>
</tr>
<tr>
<td>Soc Stud</td>
<td>38.1%</td>
<td>40.8%</td>
</tr>
<tr>
<td>Foreign Lang</td>
<td>38.1%</td>
<td>38.2%</td>
</tr>
<tr>
<td>Music</td>
<td>6.3%</td>
<td>17.9%</td>
</tr>
<tr>
<td>PE</td>
<td>7.9%</td>
<td>10.5%</td>
</tr>
<tr>
<td>Art</td>
<td>3.2%</td>
<td>5.3%</td>
</tr>
<tr>
<td>-None</td>
<td>25.4%</td>
<td>6.6%</td>
</tr>
</tbody>
</table>
Effect of School Learning & Performance on Concussion Recovery
Cognitive Demands of School Worsen Symptoms

Cognitive Exertion - 3 Visits

Presence of Symptom Worsening

- Yes: 86.6% (Visit 1), 83.3% (Visit 2), 46.8% (Visit 3)
- No Opportunity: 3.0% (Visit 1), 3.0% (Visit 2), 3.2% (Visit 3)

N= 72  Gioia et al., 2010
Sources of Mental/ Cognitive Activity?

- Prolonged concentration
- Prolonged homework
- Prolonged classes (block scheduling)
- Prolonged days
- Excessive TV, computer, socializing...

These sources and degrees of activity are likely to vary from person to person.
Keys to Recovery

- Resting the brain & getting good sleep
- No additional forces to head/ brain
- Managing/ facilitating physiological recovery
  - Avoid activities that produce symptoms
  - Not over-exerting body or brain

Ways to over-exert

- Physical
- Emotional
- Cognitive! (concentration, learning, memory)
What is cognitive “rest?”

- The concept of cognitive exertional activity (and rest) viewed along a continuum of activity.
  
  No activity/full rest  
  \[\longleftrightarrow\]  
  Full activity/no rest

- In reality, no cognitive activity/full cognitive rest not practical/likely (unless asleep or comatose).

- Therapeutic goal is to limit cognitive activity to a level that is tolerable, and does not exacerbate or cause the re-emergence of symptoms.

- Cognitive Management
What do I need to know about students returning to school after a concussion?

- Supporting student recovery requires a collaborative approach among school professionals, health care professionals, athletics, parents, and students.
- All school staff should be educated/informed about the returning student’s injury and symptoms.
- School staff must assist with transition process and making accommodations for student.
<table>
<thead>
<tr>
<th>Postconcussion Effect</th>
<th>Functional School Problem</th>
<th>Accommodation/Management Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neuropsychological deficits</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attention/concentration</td>
<td>Short focus on lecture, classwork, homework</td>
<td>Shorter assignments, break down tasks, lighter work load</td>
</tr>
<tr>
<td>Working memory</td>
<td>Holding instructions in mind, reading comprehension, mathematics calculation, writing</td>
<td>Repetition, written instructions, use of calculator, shorter reading passages</td>
</tr>
<tr>
<td>Memory consolidation/retrieval</td>
<td>Retaining new information, accessing learned information when needed</td>
<td>Smaller chunks to learn, recognition cues</td>
</tr>
<tr>
<td>Processing speed</td>
<td>Keep pace with work demand, process verbal information effectively</td>
<td>Extended time, slow down verbal information, comprehension checking</td>
</tr>
<tr>
<td>Fatigue</td>
<td>Decreased arousal/activation to engage basic attention, working memory</td>
<td>Rest breaks during classes, homework, and examinations</td>
</tr>
<tr>
<td>Postconcussion Effect</td>
<td>Functional School Problem</td>
<td>Accommodation/Management Strategy</td>
</tr>
<tr>
<td>-----------------------</td>
<td>---------------------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>Symptoms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Headaches</td>
<td>Interferes with concentration</td>
<td>Rest breaks</td>
</tr>
<tr>
<td>Light/noise sensitivity</td>
<td>Symptoms worsen in bright or loud environments</td>
<td>Wear sunglasses, seating away from bright sunlight or other light. Avoid noisy/crowded environments such as lunchroom, assemblies, and hallways</td>
</tr>
<tr>
<td>Dizziness/balance problems</td>
<td>Unsteadiness when walking</td>
<td>Elevator pass, class transition before bell</td>
</tr>
<tr>
<td>Sleep disturbance</td>
<td>Decreased arousal, shifted sleep schedule</td>
<td>Later start time, shortened day</td>
</tr>
<tr>
<td>Anxiety</td>
<td>Can interfere with concentration, student may push through symptoms to prevent falling behind</td>
<td>Reassurance from teachers and team about accommodations, workload reduction, alternate forms of testing</td>
</tr>
<tr>
<td>Depression/withdrawal</td>
<td>Withdrawal from school or friends because of stigma or activity restrictions</td>
<td>Time built in for socialization</td>
</tr>
<tr>
<td>Cognitive symptoms</td>
<td>Concentrating, learning</td>
<td>See specific cognitive accommodations (above)</td>
</tr>
<tr>
<td>Postconcussion Effect</td>
<td>Functional School Problem</td>
<td>Accommodation/Management Strategy</td>
</tr>
<tr>
<td>--------------------------</td>
<td>------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Symptom sensitivity</td>
<td>Symptoms worsen with overactivity, resulting in any of the earlier-mentioned problems</td>
<td>Reduce cognitive or physical demands below symptom threshold, provide rest breaks, complete work in small increments until symptom threshold increases</td>
</tr>
</tbody>
</table>
Purpose of Care Plan
Guide recovery
Educate
Manage exertional activity, safety

**ACUTE CONCUSSION EVALUATION (ACE)**

**CARE PLAN**

Gerard Gioia, PhD¹ & Micky Collins, PhD²

¹Children’s National Medical Center
²University of Pittsburgh Medical Center

TODAY’S DATE ___________________  INJURY DATE ___________________

This patient has been diagnosed with a concussion (mild traumatic brain injury). Based upon their symptoms, this Care Plan is designed to assist their recovery. Careful attention to this Plan can speed recovery and prevent further injury. Rest is the key. There is no return to any high risk (e.g., sports, physical education, high-speed activities) until cleared by a qualified health care professional. Physical and cognitive activity must be carefully managed during recovery. Too much activity can make symptoms worse, and lengthen recovery. As symptoms improve, the level of daily activity is slowly and carefully increased. Children and teenagers will need the help of parents, teachers, coaches, or athletic trainers to help their recovery and return to activities.

<table>
<thead>
<tr>
<th>Today the following post-concussive symptoms are present (Circle or check).</th>
<th>No reported symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical</td>
<td>Cognitive</td>
</tr>
<tr>
<td>Headaches</td>
<td>Sensitivity to light</td>
</tr>
<tr>
<td>Fatigue</td>
<td>Sensitivity to noise</td>
</tr>
<tr>
<td>Visual problems</td>
<td>Nausea</td>
</tr>
<tr>
<td>Dizziness</td>
<td>Vomiting</td>
</tr>
<tr>
<td>Balance Problems</td>
<td>Numbness/ tingling</td>
</tr>
</tbody>
</table>

**Neurocognitive Testing:**
- Attention/ Working Memory: Appropriate ___ Impaired ___ Variable ___
- Learning/ Memory: Appropriate ___ Impaired ___ Variable ___
- Response Speed: Appropriate ___ Impaired ___ Variable ___

**Exertional Effects:**
Do Symptoms Worsen with Activities?
- Physical Activity: Yes ___ No ___ No Opportunity ___
- Cognitive Activity: Yes ___ No ___ No Opportunity ___
Return to School

KEY POINTS

- Students with symptoms and/or neuropsychological dysfunction after a concussion often need support to perform school-related activities. As symptoms decrease during recovery, these supports may be gradually removed.
- Inform the teacher(s), school nurse, school psychologist or counselor, and administrator(s) about your injury and symptoms. School personnel should be instructed to watch for:
  * increased problems paying attention or concentrating
  * increased problems remembering or learning new information
  * longer time needed to complete tasks or assignments
  * greater irritability, less tolerance for stressors
  * increase in symptoms (e.g., headache, fatigue) when doing schoolwork

Until you have fully recovered, the following supports are recommended: (Check all that apply)

__No return to school__  Return on (date) __________________________

__Return to school with following supports. Review on (date)__________________________

  __Shortened day. Recommend ___ hours per day until (date)__________________________
  __Shortened classes (i.e., rest breaks during classes). Maximum class length: _____ minutes
  __Monitor symptoms (use symptom table) with cognitive exertion (mental effort such as concentration, studying)
  __Rest breaks during school day. _____ rest breaks per day. ___ AM ___PM ___ As needed/symptoms worsen. ______ minutes
  __Allowances for extended time to complete coursework/assignments and tests
  __Reduced homework load by ________%. Maximum length of nightly homework: ______ minutes. 20-30’ study, 10-15’ rest break.
  __No significant classroom or standardized testing at this time
  __Meet with guidance counselor/academic advisor to establish reasonable timeline for make-up work (as symptoms permit).
  __Request meeting of 504 or School Management Team to discuss this plan and coordinate accommodations.
What your Concussion Policy?

I'm important (and will later make your life a lot easier).
Questions for Schools to Ask and Get Prepared

1. When a student is identified with a concussion, what is your response?
2. What/ who is the team?
   a) Who does the parent contact?
   b) Who will connect with the teaching team?
   c) Method to disseminate student needs with accommodations/ strategies
3. Who will do what?
4. What will you do?
5. How will you monitor the moving target of recovery, and adapt the accommodations as needed (i.e., this is not a black & white situation)
6. What is program and frequency for in-servicing teachers about concussion and its effects?
Support / Accommodations Procedures

- Managing expectations for school demands in a student that is there in school and “looking OK”
- When does a student stay home, when does a student return to school (criteria for partial vs full day)
- How are you monitoring recovery across the day and across the week (hint: use symptom monitoring tool)
- Where/ how will you provide key accommodations?
  - Rest breaks
  - Managing tests, Reducing homework
  - Grading
What can I do to prepare for a concussion?

Prepare a concussion action plan
- Have an action plan/policy before the start of the school year
- Aim to have concussions identified and managed quickly
- Be sure that other appropriate school and athletic staff know about the plan and have been trained to use it
What can I do to prepare?

- Get educated and educate others!
  - parents, teachers/school admin, coaches, & students
- Notice when a student isn’t acting normally.
- Encourage others to:
  - Learn about the potential long-term effects of concussion and the dangers of returning to activity too soon.
  - Look out for the signs and symptoms of concussion and send students to see the appropriate healthcare person if they suspect that a concussion has occurred.
What can I do to prepare for a concussion?

- Keep students with a known or suspected concussion out of physical activity, sports, or playground activity on the day of the injury.

- AND until a health care professional with experience in evaluating for concussion says they are symptom-free and it is OK for the student to return to play.
What can I do to prepare for a concussion?

Monitor the health of your student athletes.

- Make sure to ask whether an athlete has ever had a concussion and insist that your athletes are medically evaluated and are in good condition to participate in sports.

- Keep track of athletes who sustain concussions during the school year. This will help in monitoring injured athletes who participate in multiple sports throughout the school year.
<table>
<thead>
<tr>
<th>During school year (preinjury)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Review/reinforce concussion policy and procedures</td>
</tr>
<tr>
<td>2. Monitoring for injury, parent informed of injury</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>School management (postinjury)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Medical evaluation &amp; school treatment planning</td>
</tr>
<tr>
<td>2. Gradual return to school program</td>
</tr>
<tr>
<td>3. In-school observation, monitoring, &amp; supports</td>
</tr>
<tr>
<td>4. Clearance for full return to academics</td>
</tr>
</tbody>
</table>
# Your Homework:
**Small Group Discussion**

**Worksheet for Building School Concussion Management Policies and Procedures**

<table>
<thead>
<tr>
<th>School Name: ________________________________</th>
</tr>
</thead>
</table>

## Stage 1: Policy/Preparation

<table>
<thead>
<tr>
<th>Activity</th>
<th>Evidence of Completion</th>
<th>Ideas</th>
<th>Individualized Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Concussion Management Policies &amp; Procedures (P &amp; P)</td>
<td>Written policy in school manual; copy provided to all school staff</td>
<td>Follow an example from another school</td>
<td>Who will write?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Who updates the manual?</td>
</tr>
<tr>
<td>2. Development of School Concussion Resource Team</td>
<td>Written policy in school manual</td>
<td>Who is on our concussion team? (circle all that apply) Administrator School Nurse School Psychologist Counselor Teachers Athletic Trainer Athletic Director Other__________</td>
<td>Define team’s roles? Who can be responsible for each phase?</td>
</tr>
<tr>
<td>Note: Consider elementary, middle school and high school levels</td>
<td></td>
<td></td>
<td>(1) Team Leader: Main point of contact</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(2) Definition and dissemination of student symptom status</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(3) Communication and coordination of accommodations</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(4) Symptom/recovery monitoring</td>
</tr>
</tbody>
</table>
Homework: Small Group Work

| 3. Examine teaching/support methods to support recovery, maximize learning/performance, reduce symptom exacerbation | Written policies on teaching methods | See Table 2 in Sady et al., CDC materials; ACE Care Plan |
## Homework: Small Group Work

### Post-Injury School Management

<table>
<thead>
<tr>
<th>Activity</th>
<th>Personnel</th>
<th>Procedures</th>
<th>Individualized Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before School Return: Medical evaluation</td>
<td>School makes or receives plan for school return</td>
<td>Notification of Probable Head Injury</td>
<td></td>
</tr>
<tr>
<td>1. Injury Diagnosed; symptom profile defined</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. School Admin/ Teacher Informed of Injury</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gradual Return to School</td>
<td>Return to School when key symptoms (headache, fatigue, fogginess, sensitivity to light/noise, dizziness) are tolerable (mild level at start of day, responsive to rest), and medically determined to tolerate 30+ minutes of cognitive activity</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>In-School Programming</strong></td>
<td>Team leader</td>
<td>Based on symptom status, school team determines plan for reduced schedule and participation, and for gradual increase as tolerated</td>
<td></td>
</tr>
<tr>
<td>1. Concussion Team Informed</td>
<td>Team member</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Initial accommodations defined</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Team Leader informs teachers of symptoms and likely accommodations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Day of Return</td>
<td>Team member</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Team member/ teacher(s) meets with student and family to review symptom status and accommodations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Symptom progress monitoring (daily log)</td>
<td>Team member</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Team member periodically monitors student symptom/ exertion status, and academic progress</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Emotional status assessed/ monitored</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Reports progress to team, family</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Adjustments to accommodation supports made according to symptom resolution</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Team liaisons with medical providers regarding progress, adjustments made as per medical instruction</td>
<td>Team/ medical personnel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Academic accommodations and supports continue until symptom resolution, with gradual increase in demands</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Symptom Resolution: Student cleared for return to full academic and athletic schedule</td>
<td>Medical personnel</td>
<td>Medical clearance</td>
<td></td>
</tr>
</tbody>
</table>
Summary

• Concussions can have a significant effect on the injured student’s school learning
• School learning can potentially have a significant effect on recovery from concussion
• Schools and school personnel play an important role in assisting the student with concussion.
• Understanding and monitoring the student’s symptoms is critically important
Summary

• YOU can:
  • Assist the symptomatic student by reducing demands – physical and cognitive
  • Make a plan to gradually increase the academic demands, as their symptoms reduce
  • Do not let them return to sports participation, PE, or any other risk activity until cleared by a health care professional with training in concussion evaluation and management
  • Review your organization’s concussion policy, ask for a meeting if the policy needs revised
Q & A
Clinic Locations:
- Washington, D.C.
- Laurel, MD
- Rockville, MD
- Fairfax, VA

Services:
- Post-Injury Clinic
- Baseline Testing
- Educational Talks
- School/Medical Consultation
- League/School Policy Review

Phone: 202-476-2429
www.childrensnational.org/score