New Strategies & Tools for Managing Concussions in Kids

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Objectives

- Describe a systematic pathway for clinical care
- Apply tools to support evaluation & management across the recovery timeline
Concussion/ mTBI Definition

- **A concussion (or mild traumatic brain injury)** is defined as a
  - complex pathophysiologic process affecting the brain,
  - induced by traumatic biomechanical forces secondary to direct or indirect forces to the head.

Disturbance of brain function is related to:
- neurometabolic dysfunction, rather than structural injury
- typically associated with normal structural neuroimaging findings (i.e., CT scan, MRI).

Concussion may or may not involve a loss of consciousness (LOC). (<10%)
Concussion/ mTBI Definition

- Concussion results in a **constellation of symptoms**: physical, cognitive, emotional and sleep-related.
- Duration of symptoms are **variable** may last for as short as several minutes and last as long as several days, weeks, months or even longer in some cases.

Brain Motion...
Anatomical Timeline of a Concussion
Defining the Key Factors

C. Risk Factors

A. Injury Characteristics

B. Symptom Assessment

CONCUSSION

Pre-Injury Risks
Retro-grade Amnesia 20-35%
Sec-Hrs

A. Injury Characteristics
LOC <10%
Antero-grade Amnesia 25-40%
Sec-Min

B. Symptom Assessment
Cognitive, balance/vestib/ocular-motor &
Post-Concuss Sx’s
Sec-Hrs

Hours - Days - Weeks+
Primary Care Clinical Pathway
Concussion Management
# Primary Care Clinical Pathway - Concussion

## Event: Injury Notification (via Phone Call)

<table>
<thead>
<tr>
<th>Event</th>
<th>Action</th>
<th>Communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Injury Notification</td>
<td>Triage - Determine</td>
<td>To Family:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If positive Red Flags, refer to ED</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If negative Red Flags, Office visit</td>
</tr>
</tbody>
</table>

### 2a Office Visit 1 - Diagnosis
- Assess suspected Concussion EB
- Develop management plan

### 2b Office Visit 1 - Management
- School: Return to School letter
- Symptom profile
- Sports/PE/Recreational

### 3 Office Visit - Follow Up (Weekly)
- Home Management
- School progress

### 4a Office Visit - Clearance
- Assess for full recovery
- 1. No symptom management
- 2. No return of contact physical activity
- 3. Cognitive function
- 4. Normal balance
- 5. No other medical issues

### 4b Referral Criteria for Prolonged/Complicated Recovery
- Symptom Assessment
- Appropriate referral history; refer to specialist

### 3 Office Visit - Follow Up (Weekly)
- Home Management
- School progress

### Evaluation
- To Family: Symptom Checklist
- To School: Letter re: return date, safety & symptom profile
- To Family: Education & reassurance about diagnosis & reinjury risks, early symptom-based management guidance
- To Family: Return to School Letter
- To Family: School activity management; decisions to increase tolerable cognitive/school, social, physical activity

### Sport Clearance
- To School: ACE Care Plan w updated symptom profile, input on accommodations & adjustments
- To School: clearance to begin gradual return to Sport
- To School: clearance to return to Sport
- To School: Return to Play protocol; monitor until Final Clearance

### To Family
- Counsel on gradual return process
- Discuss referral to specialist, make referral to concussion clinic
When Should We Screen/Triage?

Trigger conditions

- High speed activities (MVC, Bicycle, skateboarding)
- Sports & recreation
- Falls, especially from significant distance
- Suspected child maltreatment
- Exposure to blasts
- External injuries to head and/or scalp
Primary Care Clinical Pathway
Taking the Initial Phone Call

<table>
<thead>
<tr>
<th>Event</th>
<th>Action</th>
<th>Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Injury via Phone Call</td>
<td>Triage - Determine if ED visit is necessary</td>
<td>Two Trigger Questions (Blow, S&amp;S) ACE CDC Red Flags</td>
</tr>
</tbody>
</table>

*Determine standard procedure for: documenting the 2 triage questions and Red Flags*
CONCUSSION SCREENING

A. If a likely traumatic force to the body has occurred, ask the following two triage questions to determine if further evaluation of a suspected concussion is warranted.

1. Was there a blunt force to the head and/or did the head move back and forth with a lot of force (like whiplash)?
   - No — No Trigger
   - Yes — Next Question

2. Was there a change in mental status (e.g., confusion; dazed, disoriented, or poor memory for events around the injury) or a change in the level of consciousness (seemed out of it, not responding as you normally do)?
   - No — No Trigger
   - Yes

B. Assess for Red Flags for Neurological Deterioration to determine if patient should go immediately to the Emergency Department.

<table>
<thead>
<tr>
<th>RED FLAGS: Consider sending to the Emergency Department with sudden onset of any of the following (check all that apply).</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Headaches that worsen</strong></td>
</tr>
<tr>
<td><strong>Seizures</strong></td>
</tr>
<tr>
<td><strong>Neck pain</strong></td>
</tr>
<tr>
<td><strong>Significant irritability</strong></td>
</tr>
</tbody>
</table>

If both questions are answered “Yes” and No Red Flags are present, proceed with the Acute Concussion Evaluation (ACE).
JT - Walking Down the Care Pathway

- JT - 14 year old 9th grade male; plays soccer, basketball, lacrosse
- Injured yesterday (5/30) skateboarding, fell and struck the back of his head; no LOC but does not recall the fall or 5-10 minutes prior; 10 minutes of PTA; confusion.
- Parent calls pediatrician’s office...

Nature of Injury triggers Screening/triage questions
  - Was there Blunt force or deceleration/acceleration event?
  - Was there a change in his consciousness or neurologic/mental status?
Triggers to Concussion Evaluation

1. Blow/Force to Head/Body
   - Blunt force or deceleration/acceleration event
2. Change in Function/Behavior/Performance
   - Post-Concussion Signs & Symptoms
     - Physical: Headache, Fatigue, Dizziness
     - Cognitive: Concentrate, Memory, Speed of Thinking
     - Emotional: Irritability, Emotional alteration, Sadness
   - Alteration of consciousness or neurologic/mental status

Positive Response to both Triage Questions

Triggers Concussion Evaluation

- Dizziness
- Thinking
- Sadness
Acute Concussion Evaluation (ACE)

D. Red Flags for Neurological Deterioration

Absence of Red Flags Signals Office Evaluation

**D. RED FLAGS for acute emergency management:** Refer to the emergency department with sudden onset of any of the following:

- Headaches that worsen
- Seizures
- Focal neurologic signs
- Looks very drowsy/can’t be awakened
- Repeated vomiting
- Slurred speech
- Can’t recognize people or places
- Increasing confusion or irritability
- Weakness or numbness in arms/legs
- Neck pain
- Unusual behavioral change
- Change in state of consciousness

*Children’s National*
Triage results

- Blow to the head confirmed
- Concurrent signs and symptoms reported
- No Red Flags identified
- JT scheduled to be seen in the office tomorrow morning for further evaluation
# Primary Care Clinical Pathway: First Office Visit

<table>
<thead>
<tr>
<th>Event</th>
<th>Action</th>
<th>Tools</th>
<th>Communication</th>
</tr>
</thead>
</table>
| **Office Visit 1 - Diagnosis** | Assess suspected concussion  
Establish diagnosis | **Acute Concussion Evaluation (ACE)** | To Family, School: Symptom Checklist (Return to School Letter) |
| **Office Visit 1 - Management** | Education, Develop management strategy | **CDC Instructions/ACE Care Plan**  | To Family: Education & reassurance about diagnosis & reinjury risks, early symptom-based management guidance |
|                        | School: Return date, symptom profile        | **Return to School Letter**         | To School: Letter re: return date, safety & symptom profile |
|                        | Sports/ PE/ Recreation                      | **CDC Instructions/ACE Care Plan** | To Family/ Athletics/ PE/ Recess/ Recreation: No return / risk activity until medical clearance |
Injury to the Head Occurs

Use your **Clinical Protocol**
Identification
Diagnosis
Education/Management
Heads Up
Brain Injury in Your Practice
# Acute Concussion Evaluation (ACE)

**Acute Concussion Evaluation (ACE)**

**Physician/Clinician Office Version**

**Gerald Gona, PhD** & **McKee Collins, PhD**

[Cincinnati Children's Hospital Medical Center](http://www.cchmc.org)

[University of Pittsburgh Medical Center](http://www.upmc.edu)

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## Patient Information

- **Name:**
- **DOB:**
- **Age:**
- **Date:**
- **ID/MH:**

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### A. Injury Characteristics

**Date/Time of Injury:**

**Reporter:** Parent / Coach / Other

**Location & Impact:**

**Cause:** MVC / Pedestrian-MVC / Fall / Assault / Sports (which)

**Witnesses:** Yes / No / Unknown

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### B. Symptoms Checklist

Since the injury, has the person experienced any of these symptoms any more than usual today or in the past day?

<table>
<thead>
<tr>
<th>Symptom</th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headache</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Nausea</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Vomiting</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Fatigue</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Dizziness</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Soreness</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Sudden Onset</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

**SEEEP (4):**

- Sleep
- Emotional
- Energy
- Pain

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### C. Risk Factors for Protracted Recovery

<table>
<thead>
<tr>
<th>Factor</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concussion History</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Headache History</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Loss of Consciousness</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Past Head Injuries</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Diagnosis</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

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### D. RED FLAGS for acute emergency management:

- Refer to the emergency department with patient (name) of any of the following:
  - **Headache that worsen**
  - **Decrease in visual field**
  - **Nausea or vomiting**
  - **Dizziness or lightheadedness**
  - **Difficulty walking**
  - **Change in level of consciousness**

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### E. Diagnosis (ICD)

- **Concussion**
- **Concussion w LOC**
- **Concussion (unspecified)**

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### F. Follow-Up Action Plan

- Complete ACE Care Plan and provide copy to patient/family.
- **Other (do):**

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ACE Completed by: __________________________ MD RN NP PNP ATC © Copyright G. Gona & M. Collins, 2006
Acute Concussion Evaluation (ACE) Goals

Clinical
- Improve physician’s early diagnosis of mTBI
- Guide appropriate management

Public Health
- Improved epidemiology of mTBI
Essential Elements of MTBI/ Concussion Assessment & Management

- Early recognition of functional difference
- Detecting reliable change from “usual” functioning
  - Knowing the pre-injury history is important context
- Assessing all 4 symptom categories
- Monitor symptomatic functioning over time for change (e.g., recovery, persistent symptoms)
- Educating / Guiding recovery via care plan
- Detecting reliable change/ return to “usual” (recovery)
Acute Concussion Evaluation (ACE) Description

- ACE is a clinical protocol to assist diagnosis of mTBI/ concussion in medical settings
  - Emergency Departments
  - Pediatric Office settings
- Ages 4-adult
- Elements of clinical assessment protocol are evidence-based
- Link to follow-up care via ACE Care Plan
Pediatric Assessment and Management of Concussions

Gerard A. Gioia, PhD

Concussions and mild traumatic brain injuries have become more widely recognized and understood during the past 5 to 10 years. Earlier and more active evaluation and management of this brain injury is necessary to reduce risk to the developing child and adolescent. Pediatricians play a central role in the evaluation and management of concussions and should develop a working understanding of the injury and its clinical manifestations.

An individualized approach to evaluation and management by the pediatrician requires the development of a skillset to define the characteristics of the injury, conduct a full assessment of post-concussion symptoms, and define any risk history that may modify recovery.

This evaluation forms the basis of concussion treatment, which involves the active management of the child's and performance, and sports/recreational activities. The Acute Concussion Evaluation (ACE) and ACE Care Plan, published in the CDC’s “Heads Up: Concussion in Sports,” provides a step-by-step framework for pediatricians to effectively manage concussions and support the patient's recovery.
Acute Concussion Evaluation (ACE) Description

- Patient or parent as reporter of signs & symptoms
- Assess for presence/absence of 22 symptoms
  - somatic
  - cognitive
  - emotional
  - sleep
- Length of time approx. 5 minutes (N=150)
Acute Concussion Evaluation (ACE) Key Elements

A. Define Injury Characteristics
B. Assess for Symptoms (22) (Lovell & Collins, 1998)
C. Identify Risk Factors for Prolonged Recovery
D. Red Flags for Neurological Deterioration
E. Establish the Diagnosis
F. Plan Follow-Up Action / Referral
Acute Concussion Evaluation (ACE) Care Plan

- Link to Treatment
- Individual guidance via data-based symptom assessment and monitoring
**ACUTE CONCUSSION EVALUATION (ACE)**

**Physician/Clinician Office Version**

Gerard Gioia, PhD & Micky Collins, PhD

Children’s National Medical Center

University of Pittsburgh Medical Center

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**A. Injury Characteristics**

**Date/Time of Injury:__________________________**

**Reporter:____ Patient __ Parent __ Spouse __ Other:**

1. **Injury Description:**

   1a. Is there evidence of a forceful blow to the head (direct or indirect)?
      Yes __ No __ Unknown
   1b. Is there evidence of intracranial injury or skull fracture?
      Yes __ No __ Unknown
   1c. Location of impact: __ Frontal __ Lateral __ Occipital __ Neck __ Indirect Force

2. **Cause:**
   - MVC __ Pedestrian MVC __ Bicycle MVC __ Fall __ Assault __ Sports __ Other

3. **Amnesia Before (Retrograde):**
   - Are there any events just BEFORE the injury that your person has no memory of (even brief)?
     Yes __ No __ Duration:________

4. **Amnesia After (Anterograde):**
   - Are there any events just AFTER the injury that your person has no memory of (even brief)?
     Yes __ No __ Duration:________

5. **Loss of Consciousness:**
   - Did your person lose consciousness?
     Yes __ No __ Duration:________

6. **Early Signs:**
   - Appears dazed or stunned __ Is confused about events __ Answers questions slowly __ Repeats Questions __ Forgetful (recent info)

7. **Seizures:**
   - Were seizures observed? Yes __ No __

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**B. Symptom Check List**

Once the injury, has the person experienced any of these symptoms more than usual today or in the past day?

Indicate presence of each symptom: (0 = No, 1 = Yes).

<table>
<thead>
<tr>
<th>PHYSICAL (1)</th>
<th>COGNITIVE (4)</th>
<th>SLEEP (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headache</td>
<td>Feeling mentally foggy</td>
<td>Drowsiness</td>
</tr>
<tr>
<td>Nausea</td>
<td>Feeling slowed down</td>
<td>Sleep less than usual</td>
</tr>
<tr>
<td>Swelling</td>
<td>Difficulty concentrating</td>
<td>Sleep more than usual</td>
</tr>
<tr>
<td>Balance problems</td>
<td>Unsteadiness remembering</td>
<td>Trouble falling asleep</td>
</tr>
<tr>
<td>Dizziness</td>
<td>COGNITIVE Total (9)</td>
<td>SLEEP Total (9)</td>
</tr>
<tr>
<td>Visual problems</td>
<td>EMOTIONAL (4)</td>
<td></td>
</tr>
<tr>
<td>Fatigue</td>
<td>Instability</td>
<td></td>
</tr>
<tr>
<td>Sensitivity to light</td>
<td>Irritability</td>
<td></td>
</tr>
<tr>
<td>Sensitivity to noise</td>
<td>More emotional</td>
<td></td>
</tr>
<tr>
<td>Irritability</td>
<td>Nervousness</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PHYSICAL Total (10)</th>
<th>EMOTIONAL Total (9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(add Physical, Cognitive, Emotion, Sleep totals) Total symptom score (0-22)</td>
<td></td>
</tr>
</tbody>
</table>

---

**C. Risk Factors for Protracted Recovery**

(check all that apply)

Concentration History: __

Concentration History: __

Physical History: __

Physical History: __

Psychiatric History: __

Psychiatric History: __

*List other current medical disorders or medication usage (e.g., hypothyroid, seizures)*

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**D. RED FLAGS** for acute emergency management:

Refer to the emergency department with sudden onset of any of the following:

- Headaches that worsen
- Looks very drowsy/can’t be awakened
- Can’t recognize people or places
- Nausea
- Vomiting
- Repeated vomiting
- Increasing confusion or irritability
- Unusual behavioral change
- Nuchal rigidity
- Sturbed speech
- Weakness or numbness in arms/legs
- Change in state of consciousness

---

**E. Diagnosis (ICD):**

- Concussion w/o LOC 850.0
- Concussion w/ LOC 850.1
- Concussion (Unspecified) 850.9
- Other (854)

---

**F. Follow-Up Action Plan**

- Complete ACE Care Plan and provide copy to patient/family.
- No Follow-Up Needed

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ACE Completed by: ____________________________ MD RN NP PhD ATC

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JT – Office Exam

- Presents to primary care office one day after injury.

- Evaluation
  - ACE
  - Neurologic exam
  - Medical/developmental/psychiatric history.

- ACE Symptoms: Headaches, nausea, dizziness, balance problems, fatigue, sensitivity to light, blurry vision; fogginess, problems concentrating, slowed thinking; irritability; drowsiness, sleeping more than usual.

- Physical & cognitive activity worsens symptoms
**Acute Concussion Evaluation (ACE)**

**A. Injury Characteristics**

**Injury Description**

**Cause**

**Amnesias (retrograde, anterograde)**

**Loss of Consciousness (LOC), Seizures**

**Early Signs**

---

<table>
<thead>
<tr>
<th>A. Injury Characteristics</th>
<th>Date/Time of Injury</th>
<th>May 30, 2017</th>
<th>Reporter: <em>Patient</em> ✓ <em>Parent</em> <em>Spouse</em> <em>Other</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Injury Description</td>
<td>Skateboarding, Fell to ground, hit back of head on ground; confused/dazed initially, responding very slowly to questions at the scene and for next 30 minutes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1a. Is there evidence of a forcible blow to the head (direct or indirect)?</td>
<td>✓Yes <em>No</em> Unknown</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1b. Is there evidence of intracranial injury or skull fracture?</td>
<td><em>Yes</em> <em>No</em> ✓Unknown</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1c. Location of Impact: <em>Frontal</em> <em>Lft Temporal</em> <em>Rt Temporal</em> <em>Lft Parietal</em> <em>Rt Parietal</em> ✓ <em>Occipital</em> <em>Neck</em> <em>Indirect Force</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Cause: <em>MVC</em> <em>Pedestrian-MVC</em> <em>Fall</em> ✓ <em>Assault</em> <em>Sports (specify)</em> Other</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Amnesia Before (Retrograde) Are there any events just BEFORE the injury that you/your person has no memory of (even brief)?</td>
<td>✓Yes <em>No</em> Duration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Amnesia After (Anterograde) Are there any events just AFTER the injury that you/your person has no memory of (even brief)?</td>
<td>✓Yes <em>No</em> Duration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Loss of Consciousness: Did you/your person lose consciousness?</td>
<td><em>Yes</em> ✓ <em>No</em> Duration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. EARLY SIGNS: Appears dazed or stunned ✓ Is confused about events ✓ Answers questions slowly ✓ Repeats Questions <em>Forgetful (recent info)</em></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Seizures: Were seizures observed? No ✓ Yes <em>Detail</em></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Acute Concussion Evaluation (ACE)

#### B. Symptom Checklist

**B. Symptom Check List**

Since the injury, has the person experienced any of these symptoms any more than usual today or in the past day? Indicate presence of each symptom (0=No, 1=Yes).

*Lovell & Collins, 1998 JHTR*

<table>
<thead>
<tr>
<th>PHYSICAL (10)</th>
<th>COGNITIVE (4)</th>
<th>SLEEP (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headache</td>
<td>0 1</td>
<td>Drowsiness</td>
</tr>
<tr>
<td>Nausea</td>
<td>0 1</td>
<td>Sleeping less than usual</td>
</tr>
<tr>
<td>Vomiting</td>
<td>0 1</td>
<td>Sleeping more than usual</td>
</tr>
<tr>
<td>Balance problems</td>
<td>0 1</td>
<td>Trouble falling asleep</td>
</tr>
<tr>
<td>Dizziness</td>
<td>0 1</td>
<td></td>
</tr>
<tr>
<td>Visual problems</td>
<td>0 1</td>
<td></td>
</tr>
<tr>
<td>Fatigue</td>
<td>0 1</td>
<td></td>
</tr>
<tr>
<td>Sensitivity to light</td>
<td>0 1</td>
<td></td>
</tr>
<tr>
<td>Sensitivity to noise</td>
<td>0 1</td>
<td></td>
</tr>
<tr>
<td>Numbness/Tingling</td>
<td>0 1</td>
<td></td>
</tr>
</tbody>
</table>

**COGNITIVE Total (0-4)**: 3

**SLEEP Total (0-4)**: 1

**Exertion**: Do these symptoms worsen with:

- Physical Activity: Yes
- Cognitive Activity: Yes

**Overall Rating**: How different is the person acting compared to his/her usual self? (circle)

Normal 0 1 2 3 4 5 6

Total Symptom Score (0-22): 11
Physical Exam

- **General**: look for bumps, bruises, fractures, etc.
- **Neuro**:
  - Eye exam
    - Smooth pursuit
    - Saccades
    - Convergence
    - Pupillary Light Reflex
  - Neck ROM
  - Neck and Shoulder Muscle tightness
  - Strength/tone
  - Sensation
  - Coordination: Finger-Nose-Finger/Heel to shin
  - Gait (heel, toe, tandem)
  - Rhomberg
Critical Importance of History in Concussion Diagnosis & Mgt

- Concussion occurs within the context of the person’s developmental, medical, social and emotional/psychiatric history.
- A number of concussion “symptoms” mimic pre-existing behaviors or “symptoms” and must be distinguished.
- This must occur at the time of establishing the diagnosis as well as at the time of recovery.
Research findings have linked these risk factors to longer periods of recovery.
Acute Concussion Evaluation (ACE)

E. Diagnosis

E. Diagnosis (ICD): 
✓ Concussion w/o LOC 850.0  _ Concussion w/ LOC 850.1  ___ Concussion (Unspecified) 850.9  ___ Other (854)  ________  
  ___ No diagnosis

S06.0X0A (Concussion, with no loss of consciousness)
- Positive injury description, evidence of forcible direct/indirect blow to the head (A1a)
- Evidence of active symptoms (B) related to the trauma (Total Symptom Score >0)
- No evidence of LOC (A5)
- No skull fracture or intracranial injury (A1b)

S06.0X1A (Concussion, with brief loss of consciousness < 1 hour)
- Positive injury description, evidence of forcible direct/indirect blow to the head (A1a)
- Evidence of active symptoms (B) related to the trauma (Total Symptom Score >0)
- Positive evidence of LOC (A5: brief loss of consciousness < 1 hour, unclear evidence of LOC)
- Moderate TBI, diagnostic code: S06.2X0 (Diffuse TBI, no LOC) should be considered.

S06.0X9 (Concussion, LOC unspecified duration)
- Positive injury description, evidence of forcible direct/indirect blow to the head (A1a)
- Evidence of active symptoms (B) related to the trauma (Total Symptom Score >0)
- Unclear/unknown injury details; unclear evidence of LOC (A5)
- No skull fracture or intracranial injury (A1b)
Diagnostic Confidence

1. Was there a definite reported mechanism of injury?
   □ Yes (There was a discrete event with force to the head or rapid head movement without impact)
   □ No (There was no discrete event)

2. Was there an onset of typical symptoms within 24-48 hours of the injury event?
   □ Yes (Typical concussion symptoms AND onset < 24-48 hrs)
   □ No (Atypical concussion symptoms, delayed onset)

3. Has there been gradual recovery or stability of symptoms over the first week of the injury?
   □ Yes (There have been improving symptoms over the first week)
   □ Yes (There have been stable symptoms over the first week)
   □ No (There have been worsening symptoms over the first week)

4. Was there an alternative explanation for the symptoms?
   □ Yes (comorbid conditions: migraine, exacerbation of current concussion, anxiety, ADHD, etc)
   □ No (concussion is the only likely cause for the current symptoms)
Blow/ Force to Head/ Body

Blunt force or deceleration/acceleration event

Alteration of consciousness or mental/ neurologic status

### Post-Concussion Signs & Symptoms

<table>
<thead>
<tr>
<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>
</tr>
<tr>
<td>Fatigue</td>
<td>Memory</td>
<td>Emotional</td>
<td>Less</td>
</tr>
<tr>
<td>Balance/</td>
<td>Speed of</td>
<td>control</td>
<td>Cannot</td>
</tr>
<tr>
<td>Dizziness</td>
<td>Thinking</td>
<td>Sadness</td>
<td></td>
</tr>
</tbody>
</table>

Minutes/Hours
Acute Concussion Evaluation (ACE)

E. Follow-Up Action Plan/ Referral

F. Follow-Up Action Plan

Complete ACE Care Plan and provide copy to patient/family.

- [x] No Follow-Up Needed
- [ ] Physician/Clinician Office Monitoring: Date of next follow-up ____________

Referral:
- __ Neuropsychological Testing
- ____ Physician: Neurosurgery____ Neurology____ Sports Medicine____ Physiatrist____ Psychiatrist____ Other____________________________
- ____ Emergency Department

ACE Completed by: ________________________________ MD RN NP PhD ATC

None
Office Monitor (Re-Assess in 1-2 days)

Referral: Testing, MD, ED
# Primary Care Clinical Pathway
## First Office Visit

<table>
<thead>
<tr>
<th>Event</th>
<th>Action</th>
<th>Tools</th>
<th>Communication</th>
</tr>
</thead>
</table>
| 2a Office Visit 1 - Diagnosis | Assess suspected concussion  
Establish diagnosis | **Acute Concussion Evaluation (ACE)** | To Family, School:  
Symptom Checklist (Return to School Letter) |
| 2b Office Visit 1 - Management | School: Return date, symptom profile  
Sports/ PE/ Recreation | **CDC Instructions/ACE Care Plan**  
**CDC Instructions/ACE Care Plan** | To Family:  
Education & reassurance about diagnosis & reinjury risks, early symptom-based management guidance |
| | | Return to School Letter | To School:  
Letter re: return date, safety & symptom profile |
| | | | To Family/ Athletics/ PE/ Recess/ Recreation:  
No return / risk activity until medical clearance |
Managing Concussion Recovery
ACE Care Plan

Linking Diagnosis With Treatment

ACUTE CONCUSSION EVALUATION (ACE)

Patient Name: __________________________  DOB: __________  Age: __________

Care Plan

Patient Name: __________________________  DOB: __________  Age: __________

You have been diagnosed with a concussion (also known as a mild traumatic brain injury). This personal plan is based on your symptoms and is designed to help speed your recovery. Your careful attention to it can also prevent further injury.

Rest is the key. You should not participate in any high risk activities (e.g., sports, physical education (PE), riding a bike, etc.) you still have any of the symptoms below. It is important to limit activities that require a lot of thinking or concentration (homework, job-related activities), as this can also make your symptoms worse. If you no longer have any symptoms and believe that your concentration and thinking are back to normal, you can slowly and carefully return to your daily activities. Children and teenagers will need help from their parents, teachers, coaches, or athletic trainers to monitor their recovery and return to activities.

Today the following symptoms are present (circle or check).

**Physical**
- Sensitivity to light
- Feeling mentally foggy
- Irritability
- Drowsiness

**Thinking**
- Sensitivity to noise
- Problems concentrating
- Sadness
- Sleeping more than usual

**Emotional**
- Fatigue
- Numbness/Tingling
- Problems remembering
- Feeling more emotional
- Sleeping less than usual

**Visual problems**
- Vomiting
- Feeling more slowed down
- Nervousness
- Trouble falling asleep

**Sleep**
- Balance Problems
- Dizziness

RED FLAGS: Call your doctor or go to your emergency department if you suddenly experience any of the following:
- Loss of consciousness (even if brief)
- Changes in cognition (such as confusion)
- Difficulty focusing
- Nausea or vomiting
- Headache
- Changes in sleep
- New behavior or changes in personality
- New weakness or numbness
- Difficulty swallowing
- Changes in balance

**Follow-Up Action Plan**
- Complete ACE Care Plan and provide copy to patient/family.
- Follow-up appointment: Date of next follow-up: __________

**Referral**
- Neuropsychological Testing
- Physical: Neurosurgery  Neurology  Sports Medicine  Psychiatrist  Other
- Emergency Department

ACE Completed by: __________________________  MD  RN  NP  PhD  ATC  Copyright

This form is part of the Head Up Brain Injury Project tool developed by the Centers for Disease Control and Prevention (CDC).
General Principles of Recovery

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

Ways to over-exert
- Physical
- Cognitive! (concentration, learning, memory)
  - (Emotional)
Active Recovery Management

Key Messages
- You will get better.
- You will improve and recover.
- You have control of your activity.
- Your efforts to control your activity and time will pay off.
- Find your “sweet spot” of activity, gradually increase as tolerated.

Children's National
What to Do After A Concussion

Your child was seen today for a concussion. This handout has information about how to help your child feel better after a concussion. Keep this information on hand to help with their recovery. Be sure to watch for changes in how your child is acting or feeling and if symptoms are getting worse. You may notice changes in their symptoms before they do.

Schedule a Follow Up Appointment with Your Child’s Doctor or Nurse

Be sure to schedule a follow up appointment with your child’s regular doctor or nurse. Due to their injury, your child may need to take some time off from things like school. If so, ask your child’s doctor or nurse for written instructions about when they can safely return to school, sports, or other activities such as work, driving a car, and riding a bike.

What is a Concussion?

A concussion is a type of traumatic brain injury. It is caused by a bump, blow, or jolt to the head or body that causes the head and brain to move quickly back and forth. This sudden movement can cause the brain to bounce around or twist in the skull, creating chemical changes in the brain and sometimes stretching and damaging the brain cells. Health care professionals sometime refer to concussions as “mild” traumatic brain injuries because they are usually not life-threatening. Even so, their effects can be serious.

What Are Some of the Concussion Symptoms My Child May Experience?

Below is a list of some of the symptoms people can experience following a concussion. Concussion symptoms may appear during the normal recovery process and generally are not signs of permanent damage or a serious health problem. If there are any symptoms that concern you or are getting worse, be sure to talk with your doctor or nurse.

| THINKING/REMEMBERING | Difficulty thinking | Feeling slowed | Difficulty | Difficulty remembering |
|-----------------------|--------------------|---------------|------------|------------------------|----------------------|
|                        |                    |               |            |                        |                      |
### What to Do After A Concussion

<table>
<thead>
<tr>
<th>STEP</th>
<th>ACTIVITY</th>
<th>INSTRUCTIONS</th>
</tr>
</thead>
</table>
| 2 | LIGHT ACTIVITY | - Find relaxing activities at home for your child. They should continue to avoid activities that put themselves at risk for another injury to the head and brain.  
- Return to school on a gradual basis. Use your child’s symptoms to guide their return to activities. If their symptoms do not worsen during an activity then this activity is OK for them. If symptoms worsen, your child should cut back on how much they do that activity until tolerated.  
- Make sure your child continues to get maximum nighttime sleep.  
- Limit daytime naps or return to your child’s regular daytime nap schedule (as appropriate for their age). |
| 3 | MODERATE ACTIVITY | - Help your child take breaks only if their concussion symptoms worsen.  
- They can return to their regular school and work (if relevant) schedule. |
| 4 | BACK TO REGULAR ACTIVITY: | Recovery from a concussion is when your child is able to do all of their regular activities without experiencing any concussion symptoms caused by their injury. |

### What If I Don't Feel Like My Child is Getting Better?

If you do not feel like your child is getting better talk with their doctor or nurse. Keep track of your child’s concussion symptoms and share this information with their doctor or nurse. This may help their doctor or nurse identify the best treatments for your child’s concussion symptoms. You may also need to take your child to see a specialist who has experience treating brain injuries. Ask your child’s doctor or nurse for names of brain injury specialists in your area.

### When Can My Child Return to School or Work (if relevant)?

Your child may need to take a day or two off from school or work (if relevant). Ask their doctor or nurse for written instructions about when your child can safely return to school, work and other activities such as riding a bike or driving a car.

Getting written instructions from their doctor or nurse can help assist with managing your child’s return to school and work. For a short time, they may need extra help or support after a concussion, such as:  
- Rest breaks  
- More time to take tests or complete tasks  
- Extra class time or help with assignments  
- Instruction or help with making homework
POST-CONCUSSION RETURN TO SCHOOL LETTER

Dear School Staff:

[Student] JT sustained a concussion on 5/30/2017

Recovery typically takes between several days to several weeks. The student should return to school as soon as they can tolerate it but many students will benefit from some accommodations to their school programme as they recover. As symptoms resolve and the student’s learning/cognitive functioning returns to normal, s/he can gradually progress to their normal school day with reduced supports.

Current Symptoms: The student is currently reporting the following symptoms as indicated by the (√) below. These can be viewed as targets for supportive classroom accommodations to assist a successful return. See suggested supports for these symptoms on page 2.

<table>
<thead>
<tr>
<th>PHYSICAL</th>
<th>COGNITIVE</th>
<th>EMOTIONAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>√ Headaches</td>
<td>√ Fatigue</td>
<td>√ Feeling mentally foggy</td>
</tr>
<tr>
<td>√ Sensitivity to light</td>
<td>□ Sensitivity to noise</td>
<td>√ Memory problems</td>
</tr>
<tr>
<td>√ Blurry/double vision</td>
<td>√ Nausea/vomiting</td>
<td>√ Slowed thinking/performance</td>
</tr>
<tr>
<td>□ Balance Problems</td>
<td>√ Dizziness</td>
<td>√ Difficulty concentrating</td>
</tr>
</tbody>
</table>

Return to School: The student can return to school when:

(1) S/he can concentrate on school work for 30 minutes before symptoms worsen significantly.
(2) Symptom exacerbation reduces/resolves with cognitive rest breaks, allowing return to activity.

Based on the current symptoms, he/she is permitted to return to school.

√ is excused for 2 days

Safety Restrictions: To reduce risk for re-injury, there should be
Provision of School Supports: Listed are some suggested accommodations for consideration by school personnel, tailored to the student’s specific symptoms:

<table>
<thead>
<tr>
<th>Post-concussion symptom</th>
<th>Effect on school learning</th>
<th>Accommodation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical Symptoms</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Headache</td>
<td>Difficulty concentrating</td>
<td>Frequent breaks, quiet area, hydration</td>
</tr>
<tr>
<td>Fatigue</td>
<td>Decreased attention, concentration, low energy</td>
<td>Frequent breaks, shortened day, attendance in fewer classes</td>
</tr>
<tr>
<td>Light/noise sensitivity</td>
<td>Worsening symptoms (headache)</td>
<td>Sunglasses, ear plugs/headphones, avoid noisy areas (cafeterias, assemblies, sport events, music class), limit computer work</td>
</tr>
<tr>
<td>Dizziness/ balance</td>
<td>Unsteadiness when walking, room feels like it is spinning</td>
<td>Elevator/lift pass (if available) Class transition before bell</td>
</tr>
<tr>
<td><strong>Cognitive Symptoms</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficulty concentrating</td>
<td>Limited focus on schoolwork</td>
<td>Shorter assignments, decreased workload, frequent breaks, having someone read out loud, more time to complete assignments/tests, quiet area to complete work</td>
</tr>
<tr>
<td>Working/ short-term memory</td>
<td>Forgetting instructions, oral lecture, reading material, thoughts during tasks</td>
<td>Repetition; Written instructions Provide student with teacher generated class notes</td>
</tr>
<tr>
<td>Difficulty remembering</td>
<td>Difficulty retaining new information, remembering instructions, accessing learned information</td>
<td>Written instructions, smaller amounts to learn, repetition</td>
</tr>
<tr>
<td>Slow speed of performance / writing</td>
<td>Unable to keep pace with work load, slower reading/writing/calculation</td>
<td>Extended time to complete coursework, assignments, tests Reduce/slow down verbal information and written assignments</td>
</tr>
</tbody>
</table>

*Note: The table continues with additional entries for other symptoms not shown here.*
### Follow Up Visit

<table>
<thead>
<tr>
<th>Office Visit - Follow Up (Weekly)</th>
<th>Monitor symptoms, exertional response to management</th>
<th>Post-Concussion Symptom Inventory-PCSI (Parent, Student)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home Management</td>
<td>ACE Care Plan</td>
<td></td>
</tr>
<tr>
<td>School progress update</td>
<td>School Symptom Monitor</td>
<td></td>
</tr>
</tbody>
</table>

### Symptom Tracking
- ACE Sx checklist (present, absent)
- Post-Concussion Symptom Checklist (Parent, Child) Graded (0-6)
### Post-Concussion Symptom Inventory for Children (PCSI-C)

#### Pre/Post Version 5 to 12

<table>
<thead>
<tr>
<th>Name:</th>
<th>_______</th>
<th>Today's date:</th>
<th>______</th>
<th>Birthdate:</th>
<th>______</th>
<th>Age</th>
<th>______</th>
<th>Grade:</th>
<th>______</th>
</tr>
</thead>
</table>

**Instructions:** We would like to know if you have had any of these symptoms before your injury. Next, we would like to know if these symptoms have changed after your injury.

I am going to ask you to tell me about your symptom at two points in time - Before the Injury and Yesterday/Today. Interviewer: Please circle only one answer.

**Age 5-7:** Only 5 items

<table>
<thead>
<tr>
<th>Item</th>
<th>Question</th>
<th>Before the Injury / Pre-Injury</th>
<th>Current Symptoms / Yesterday and Today</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Have you had headaches? Has your head hurt?</td>
<td>0 1 2</td>
<td>0 1 2</td>
</tr>
<tr>
<td>2.</td>
<td>Have you felt sick to your stomach or nauseous?</td>
<td>0 1 2</td>
<td>0 1 2</td>
</tr>
<tr>
<td>3.</td>
<td>Have you felt dizzy? (like things around you were spinning or moving)</td>
<td>0 1 2</td>
<td>0 1 2</td>
</tr>
<tr>
<td>4.</td>
<td>Have you felt grumpy or irritable? (like you were in a bad mood)</td>
<td>0 1 2</td>
<td>0 1 2</td>
</tr>
<tr>
<td>5.</td>
<td>Has it been hard for you to pay attention to what you are doing? (like homework or chores, listening to someone, or playing a game)</td>
<td>0 1 2</td>
<td>0 1 2</td>
</tr>
</tbody>
</table>

**Age 8-12:** 17 items

<table>
<thead>
<tr>
<th>Item</th>
<th>Question</th>
<th>Before the Injury / Pre-Injury</th>
<th>Current Symptoms / Yesterday and Today</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.</td>
<td>Have you felt more drowsy or sleepy than usual?</td>
<td>0 1 2</td>
<td>0 1 2</td>
</tr>
<tr>
<td>7.</td>
<td>Have bright lights bothered you more than usual? (like when you were in the sunlight, when you looked at lights, or watched TV)</td>
<td>0 1 2</td>
<td>0 1 2</td>
</tr>
<tr>
<td>8.</td>
<td>Have loud noises bothered you more than usual? (like when people were talking, when you heard sounds, watched TV, or listened to loud music)</td>
<td>0 1 2</td>
<td>0 1 2</td>
</tr>
<tr>
<td>9.</td>
<td>Have you had any balance problems or have you felt like you might fall when you walk, run or stand?</td>
<td>0 1 2</td>
<td>0 1 2</td>
</tr>
<tr>
<td>10.</td>
<td>Have you felt sad?</td>
<td>0 1 2</td>
<td>0 1 2</td>
</tr>
<tr>
<td>11.</td>
<td>Have you felt nervous or worried?</td>
<td>0 1 2</td>
<td>0 1 2</td>
</tr>
<tr>
<td>12.</td>
<td>Have you felt like you are moving more slowly?</td>
<td>0 1 2</td>
<td>0 1 2</td>
</tr>
<tr>
<td>13.</td>
<td>Have you felt like you are thinking more slowly?</td>
<td>0 1 2</td>
<td>0 1 2</td>
</tr>
<tr>
<td>14.</td>
<td>Has it been hard to think clearly?</td>
<td>0 1 2</td>
<td>0 1 2</td>
</tr>
</tbody>
</table>

**Adjusted Sx Score = Post – Pre-Injury**
Adjusted Sx Score = Post – Pre-Injury

**Post-Concussion Symptom Inventory**  
*Ages 13-18 (PCSI-SR13)*  
*Pre/Post Version*

<table>
<thead>
<tr>
<th>Patient Name:</th>
<th>Today's date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birthdate:</td>
<td>Age:</td>
</tr>
</tbody>
</table>

**Instructions:** We would like to know if you had any of these symptoms before your injury. Next, we would like to know if these symptoms have changed after your injury. Please rate the symptom at two points in time—Before the Injury/Pre-Injury and Current Symptoms/Yesterday and Today.

Please answer all the items the best that you can. Do not skip any items. Circle the number to tell us how much of a problem this symptom has been for you.

<table>
<thead>
<tr>
<th></th>
<th>Before the Injury/Pre-Injury</th>
<th>Current Symptoms/Yesterday and Today</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Headache</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Nausea</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Balance problems</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Dizziness</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Visual problems (double vision, blurring)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Move in a clumsy manner</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Sensitivity to light</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Sensitivity to noise</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Irritability</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Sadness</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Nervousness</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Difficulty concentrating</td>
<td></td>
</tr>
</tbody>
</table>

*Office Use Only*  
*Emotional*  
*Physical*  

**Adjusted Sx Score = Post – Pre-Injury**
## Post-Concussion Symptom Inventory

**Parent - Ages 5 to 18 (PCSI-P)**

**Pre/Post Version**

<table>
<thead>
<tr>
<th>Student’s Name: __________________________</th>
<th>Today’s date: __________</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birthdate: _____________________________</td>
<td>Age/ Grade: ____________</td>
</tr>
</tbody>
</table>

**Person Completing Form:** __________________________ **Relation:** Mother __ Father __ Other __

**Instructions:** We would like to know if your child had problems with these symptoms before their injury. Next, we would like to know if these symptoms have changed after the injury. Please rate the problem at two points in time—**Before the Injury/ Pre-Injury** and **Current Symptoms/ Yesterday and Today**.

Please answer all the items the best that you can. Do not skip any items. Circle the number to tell us how much of a problem this symptom has been for your child.

0 = Not a problem 3 = Moderate problem 6 = Severe problem

<table>
<thead>
<tr>
<th></th>
<th>Before the Injury/ Pre-Injury</th>
<th>Current Symptoms/ Yesterday and Today</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Complains of headaches</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>2</td>
<td>Complains of nausea</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>3</td>
<td>Has balance problems</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>4</td>
<td>Appears or complains of dizziness</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>5</td>
<td>Has or complains of visual problems (blurry, double vision)</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>6</td>
<td>Appears to move in a clumsy manner</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>7</td>
<td>Sensitivity to light</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>8</td>
<td>Sensitivity to noise</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>9</td>
<td>Acts irritable</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>10</td>
<td>Appears sad</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>11</td>
<td>Acts nervous</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>12</td>
<td>[Office Use Only] Physical</td>
<td>Total Pre =</td>
</tr>
<tr>
<td></td>
<td>[Office Use Only] Emotional</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td></td>
<td>Pre-Injury”</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>13</td>
<td>Has difficulty concentrating</td>
<td>0 1 2 3 4 5 6</td>
</tr>
<tr>
<td>14</td>
<td>[Office Use Only] Emotional</td>
<td>Total Pre =</td>
</tr>
<tr>
<td>15</td>
<td>[Office Use Only] Physical</td>
<td>0 1 2 3 4 5 6</td>
</tr>
</tbody>
</table>

**Adjusted Sx Score:** Post – Pre-Injury
Ongoing Prescriptive Management

ACE Care Plan
Symptom definition
Reinforcing Balanced Activity-Exertion
Sleep recommendations
Emotional response

Guidance on Return to:
- Daily Activities
- School
- Physical Activity/ Sport
Concussion Management

- Protect/ Restrict further Risk
- Managed Activity/ Gradual Reintroduction
- Symptom Monitor
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

You have been diagnosed with a concussion, also known as a traumatic brain injury. To prevent further injury, do not return to any high-risk activities (e.g., sports, physical education, driving, etc.) until cleared by a qualified healthcare professional. To promote recovery, physical and cognitive activity must be carefully managed. Pay attention to your symptoms (listed below) and avoid too much of any activity that makes your symptoms worse, as this may affect your recovery. As symptoms improve, you can increase the level of daily activity slowly and carefully. You may need the help of parents, school, and athletic personnel to recover and safely return to activities.

Today the following post-concussive symptoms are present (Circle or check):

No reported symptoms

<table>
<thead>
<tr>
<th>Physical</th>
<th>Cognitive</th>
<th>Emotional</th>
<th>Sleep</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headaches</td>
<td>Sensitivity to light</td>
<td>Feeling mentally foggy</td>
<td>Irritability</td>
</tr>
<tr>
<td>Fatigue</td>
<td>Sensitivity to noise</td>
<td>Problems concentrating</td>
<td>Sadness</td>
</tr>
<tr>
<td>Visual problems</td>
<td>Nausea</td>
<td>Problems remembering</td>
<td>Feeling more emotional</td>
</tr>
<tr>
<td>Dizziness</td>
<td>Vomiting</td>
<td>Feeling more slowed down</td>
<td>Nervousness</td>
</tr>
<tr>
<td>Balance Problems</td>
<td>Numbness/tingling</td>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>

**Key Rule for Activity**
“Not Too Little, Not Too Much”

**KEY POINTS**

**Returning to Daily Activities**
Sleep: Be sure to get adequate sleep at night; no late nights or overnights; keep the same bedtime on weekdays and weekends. Take daytime naps or rest breaks when you feel tired or fatigued, unless they interfere with falling asleep at night.
Activity: Balance physical and cognitive activity with rest breaks. Too much activity may worsen symptoms and could affect your recovery. Be sure not to do too little activity! Find the right balance.
- Physical activity includes physical education, sports practices, weight-training, running, exercising, lifting, etc.
- Cognitive activity includes concentration, learning, reading or writing (e.g., schoolwork, job-related mental activity).

Use Symptoms as your guide: Pay attention to your symptoms. As they get better, increase your activities gradually. Carefully monitor for return or worsening of symptoms. Let the worsening and/or return of symptoms be your sign to slow down.

Food and Drink: Maintain adequate hydration (drink lots of fluids) and an appropriate diet during recovery.

Emotions: During recovery, it is normal to feel frustrated, nervous or sad because you do not feel right and your activity is reduced. Seek professional help if you feel unsafe or have thoughts of self-harm.

Driving: You are advised not to drive if you have significant symptoms or cognitive impairment, as these can interfere with safe driving.

**KEY POINTS**

**Returning to School**

**Work-Rest-Work-Rest**
RETURNING TO PHYSICAL ACTIVITIES

KEY POINTS

- **Return to exercise carefully.** Ask your healthcare provider whether you are ready to exercise. Exercise can be helpful for your recovery, but too much may have a negative effect. Do not do exercises that cause a significant return or worsening of symptoms.
- Be sure that the PE teacher, teacher at school recess, coach, and/or athletic trainer are aware of your injury and symptoms. You should not do activities that put you at risk for additional injury or cause your symptoms to worsen significantly.

___ No physical exercise at this time.
___ Begin / Continue physical exercise as indicated below:

<table>
<thead>
<tr>
<th>Day/ date*</th>
<th>Physical Exertional Activity (NON-CONTACT ONLY)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Low levels of physical exertion that may include walking, light stationary biking, light weightlifting (lower weight, higher reps, no bench, no squat).</td>
</tr>
<tr>
<td>2.</td>
<td>Moderate levels of exercise with body/ head movement as tolerated. Includes moderate jogging/ brief running, moderate-intensity stationary biking, moderate-intensity weightlifting (reduced time and/or weight from typical routine).</td>
</tr>
<tr>
<td>3.</td>
<td>Heavy exertion. You may return to your typical, full level of exercise. This includes sprinting/running, high-intensity stationary biking, regular weightlifting routine, non-contact sport-specific drills (in 3 planes of movement).</td>
</tr>
</tbody>
</table>

* Pay careful attention to your symptoms/ cognitive skills at each stage of exertion. Move to the next level of exertion only if symptoms do not worsen at the current level. If your symptoms worsen, let your healthcare provider know, and reduce activities to the previous level.

RETURNING TO SPORTS/ PHYSICAL EDUCATION

KEY POINTS

- **You should NEVER return to play if you still have ANY symptoms.** You should not return to activities involving risk of re-injury until you are symptom-free and fully recovered. Most states have a law that you must be cleared by a licensed healthcare provider to return.
- Do not play sports with friends, in PE, or at recess until you are fully recovered and cleared by your healthcare provider.
- It is normal to feel frustrated, sad and even angry because you cannot return to sports right away. With any injury, a full recovery will reduce the chances of getting hurt again.

___ Physical education (PE) class: ___No Activities ___No competition, Skills/Exercise OK ___Full Return, Date:____________
___ Sports practices/Games: ___No Activities ___ Exercise & Skill work ___Supervised RTP ___Full Return, Date:____________

The Gradual Return to Play (RTP) should be under the supervision of an appropriate healthcare provider (e.g., athletic trainer). This is typically a 5-step process, involving non-contact stages 1, 2, 3 of increasing exercise, and contact stages 4 and 5. Allow at least 24 hours between each stage and assure that you remain symptom free before progressing. Full clearance for return to play must come from a licensed healthcare provider with training in concussion management. Cognitive functions, balance, and symptoms must return to ‘normal’ before it is safe to return to play.

Follow-Up:

___ Report any other new or changed symptoms. ___Date:______
<table>
<thead>
<tr>
<th>Event</th>
<th>Action</th>
<th>Tools</th>
<th>Communication</th>
</tr>
</thead>
</table>
| 4a Office Visit - Clearance | Assess for full recovery  
1. No symptoms at rest/ no medication use to manage symptoms  
2. No return of symptoms with typical, non-contact physical and cognitive activities  
3. Cognitive functions at typical baseline  
4. Normal balance and coordination  
5. No other medical/neuro complaints | *PCSI (Student, Parent)  
*Medical Clearance for Gradual Return  
*Gradual Return to Sport guide | To Family:  
Counsel on gradual return process  
To School:  
Clearance to return to PE/recess  
To Sport:  
Clearance to begin gradual Return to Play protocol; monitor until Final Clearance |
Criteria for Recovery

Criteria for Final Medical Clearance for Return to Competition

The student-athlete must meet all of these criteria to receive medical clearance.

1. No symptoms at rest/ no medication use to manage symptoms (e.g., headaches)
2. No **return** of symptoms with typical physical and cognitive activities of daily living
3. Neurocognitive functioning at typical baseline
4. Normal balance and coordination
5. No other medical/ neurological complaints/ findings
6. Successful Completion of Gradual Return to Play Program
<table>
<thead>
<tr>
<th>Event</th>
<th>Action</th>
<th>Tools</th>
<th>Communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Referral Criteria for 4b Prolonged/Complicated Recovery</td>
<td>Symptom Assessment: patient not making appropriate recovery progress or complicated history; refer to concussion specialist for consultation/management</td>
<td>Specialist Referral Criteria</td>
<td>To Family: Discuss referral to specialist, make referral to concussion clinic</td>
</tr>
</tbody>
</table>
When Recovery is complicated...

Concussion Specialty Referral Guideline

Concussion/ Mild TBI

Criteria for Specialty Referral

- Complex injury (e.g., multiple blows within short period of time, injury with rotational/neck injury, high severity of signs and symptoms)
- Persistent overall symptoms (greater than 2 weeks) without improvement (<20% symptom improvement)
- No change in neurocognitive performance or functioning
- Presence of risk factors (e.g., medical/neurological, psychiatric, learning/attention disorders) contributing to prolonged recovery
- Persistent cognitive dysfunction or school problems
- Intensive school program recommendation
- Significant emotional factors possibly interfering with recovery
- History of multiple concussions: assess risk/vulnerability
- Confirm/clearance for return to risk activities

Refer to Specialty clinic (e.g., SCORE clinic)
Summary

- Establish procedure (using trigger conditions) to initiate and document 2 Triage Questions and Red Flags
- Office Assessment: ACE, neuro exam, history
- Establish the diagnosis, employ 4 diagnostic confidence criteria
- Provide initial education and management guidance, decision about Return to School
- Set follow up appointment to monitor progress
- Know criteria for medical clearance/referral