

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.



CDC Heads Up: Brain Injury in Your Practice (2007)

Concussion/ mTBI Definition

- 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

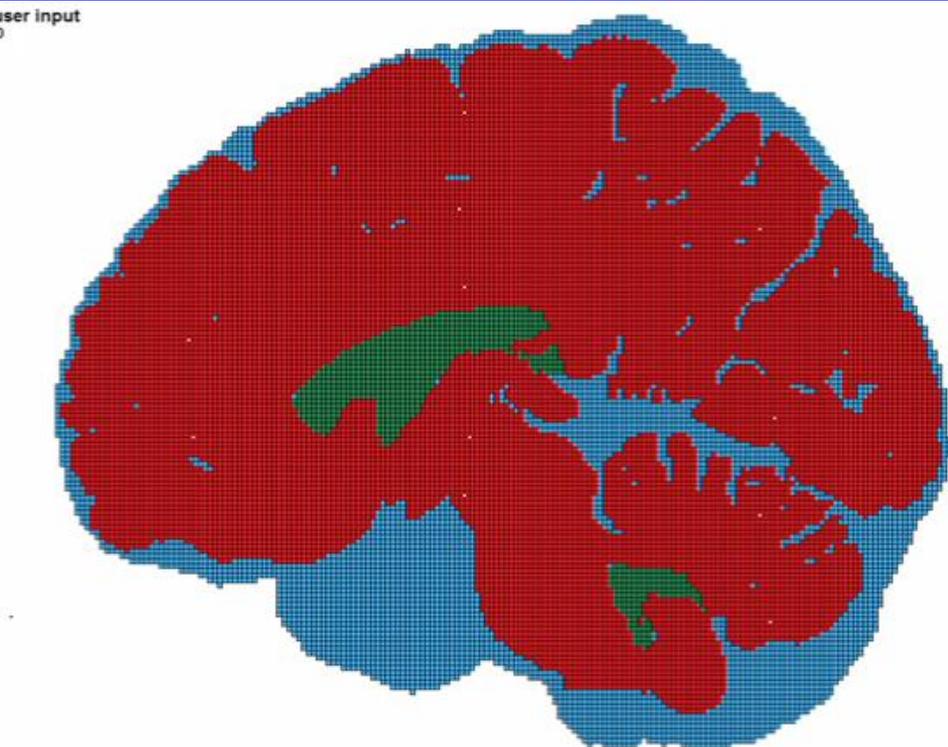
- Concussion results in a constellation of symptoms:
 - physical, cognitive, emotional and sleep-related.
- Duration of symptoms are variable may last for as short as several minutes and last as long as several days, weeks, months or even longer in some cases.



CDC Heads Up: Brain Injury in Your Practice (2007)



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%



LOC
<10%

Antero-grade Amnesia
25-40%

Cognitive, balance/
vestib/ocular-motor &
Post-Concuss Sx's

Sec-Hrs

Sec-Min

Sec-Hrs

Hours - Days - Weeks+



Primary Care Clinical Pathway Concussion Management



Event		Event		Communication	
1	Injury Notification (via Phone Call)	Triage - Det	1	Injury Notification (via Phone Call)	<p>To Family:</p> <p>If positive Red Flags, refer to ED</p> <p>If negative Red Flags, Office visit</p>
2a	Office Visit 1 - Diagnosis	Assess suspec Establish diag	2a	Office Visit 1 - Diagnosis	<p>To Family, School: Symptom Checklist (Return to School Letter)</p> <p>To Family: Education & reassurance about diagnosis & reinjury risks, early symptom-based management guidance</p>
2b	Office Visit 1 - Management	Concussion E Develop man School: Retur Symptom pro Sports/ PE/ R	2b	Office Visit 1 - Management	<p>To School: Letter re: return date, safety & symptom profile</p> <p>To Family/ Athletics/ PE/ Recess/ Recreation: No return / risk activity until medical clearance</p>
3	Office Visit - Follow Up (Weekly)	Monitor sym management Home Manag School progr	3	Office Visit - Follow Up (Weekly)	<p>To Family: ACE Care Plan with updated symptom profile</p> <p>To Family: activity management; decisions to increase tolerable cognitive/school, social, physical activity</p> <p>To School: ACE Care Plan w updated symptom profile, input on accommodations & adjustments</p>
4a	Office Visit - Clearance	Assess for full 1. No symptom manage sympt 2. No return of contact physic 3. Cognitive fu 4. Normal bala 5. No other m	4a	Office Visit - Clearance	<p>To Family: counsel on gradual return process</p> <p>To School: clearance to return to PE/recess</p> <p>To Sport: clearance to begin gradual Return to Play protocol; monitor until Final Clearance</p>
4b	Referral Criteria for Prolonged/ Complicated Recovery	SymptomASSE appropriate re history; refer t	4b	Referral Criteria	<p>To Family: Discuss referral to specialist, make referral to concussion clinic</p>

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

Youth Concussion System - *Primary Care Clinical Pathway*

Event	Action	Tools
1 Injury via Phone Call	Triage - Determine if ED visit is necessary	Two Trigger Questions (Blow, S&S) <i>ACE CDC Red Flags</i>

* 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.

RED FLAGS: Consider sending to the Emergency Department with sudden onset of any of the following (check all that apply).			
Headaches that worsen		Look very drowsy, can't be awakened	Can't recognize people or places
Seizures		Repeated vomiting	Increasing confusion
Neck pain		Slurred speech	Weakness or numbness in arms or legs
Significant irritability		Unusual behavior change	Loss of consciousness

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



2

**Positive Response to
both Triage Questions
Triggers Concussion
Evaluation**



Acute Concussion Evaluation (ACE)

D. Red Flags for Neurological Deterioration

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 | * Neck pain |
| * Seizures | * Repeated vomiting | * Increasing confusion or irritability | * Unusual behavioral change |
| * Focal neurologic signs | * Slurred speech | * Weakness or numbness in arms/legs | * Change in state of consciousness |

**Absence of Red Flags
Signals Office
Evaluation**



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

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

Injury to the Head Occurs

Use your Clinical Protocol

Identification

Diagnosis

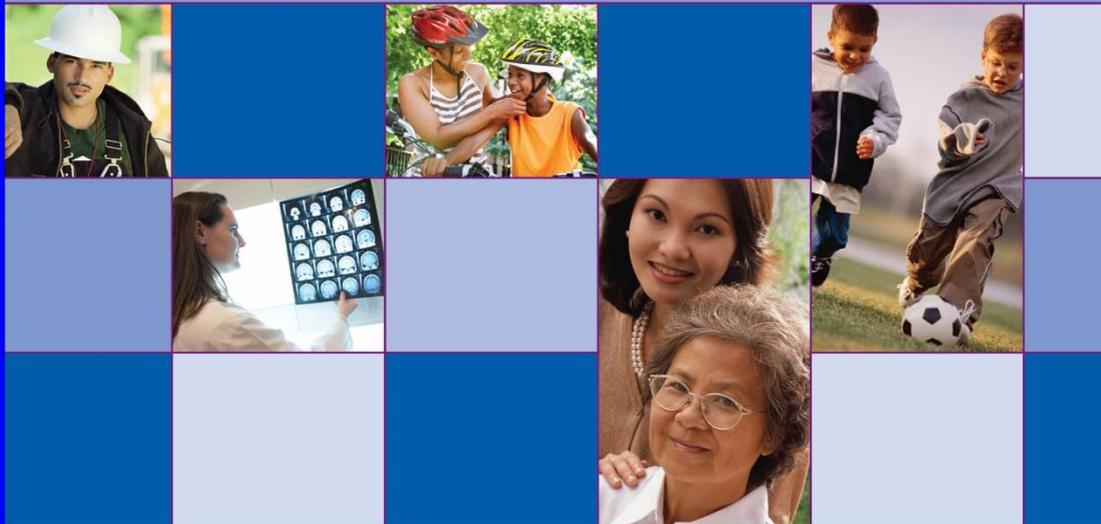
Education/Management





Heads Up

Brain Injury in Your Practice



Children's National

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL AND PREVENTION

Acute Concussion Evaluation (ACE)

ACUTE CONCUSSION EVALUATION (ACE)

Physician/Clinician Office Version
 Gerard Giola, PhD¹ & Micky Collins, PhD²
¹Children's National Medical Center
²University of Pittsburgh Medical Center

Patient Name _____
 DOB: _____ Age: _____
 Date: _____ ID/MR# _____

A. Injury Characteristics Date/Time of Injury _____ Reporter: Patient Parent Spouse Other _____

1. Injury Description _____

1a. Is there evidence of a forcible 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 LT Temporal RT Temporal LT Parietal RT Parietal Occipital Neck Indirect Force

2. Cause: MVC Pedestrian-MVC Fall Assault Sports (specify) _____ Other _____

3. **Amnesia Before (Retrograde)** Are there any events just BEFORE the injury that you/ person has no memory of (even brief)? Yes No Duration _____

4. **Amnesia After (Anterograde)** Are there any events just AFTER the injury that you/ person has no memory of (even brief)? Yes No Duration _____

5. **Loss of Consciousness:** Did you/ 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? No Yes Detail _____

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

PHYSICAL (10)		COGNITIVE (4)		SLEEP (4)	
Headache	0 1	Feeling mentally foggy	0 1	Drowsiness	0 1
Nausea	0 1	Feeling slowed down	0 1	Sleeping less than usual	0 1 N/A
Vomiting	0 1	Difficulty concentrating	0 1	Sleeping more than usual	0 1 N/A
Balance problems	0 1	Difficulty remembering	0 1	Trouble falling asleep	0 1 N/A
Dizziness	0 1	COGNITIVE Total (0-4)		SLEEP Total (0-4)	
Visual problems	0 1	EMOTIONAL (4)		Exacerbation: Do these symptoms <u>worsen</u> with: Physical Activity <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A Cognitive Activity <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A Overall Rating: How <u>different</u> is the person acting compared to his/her usual self? (circle) Normal 0 1 2 3 4 5 6 Very Different	
Fatigue	0 1	Irritability	0 1		
Sensitivity to light	0 1	Sadness	0 1		
Sensitivity to noise	0 1	More emotional	0 1		
Numbness/Tingling	0 1	Nervousness	0 1	PHYSICAL Total (0-10)	
(Add Physical, Cognitive, Emotion, Sleep totals)		EMOTIONAL Total (0-4)		Total Symptom Score (0-22)	

C. Risk Factors for Protracted Recovery (check all that apply)

Concussion History? Y N	Headache History? Y N	Developmental History	Psychiatric History
Previous # 1 2 3 4 5	Prior treatment for headache	Learning disabilities	Anxiety
Longest symptom duration Days _____ Weeks _____ Months _____ Years _____	History of migraine headache Personal _____ Family _____	Attention-Deficit/Hyperactivity Disorder	Depression
If multiple concussions, less force caused reinjury? Yes No		Other developmental disorder	Sleep disorder
			Other psychiatric disorder

List other comorbid medical disorders or medication usage (e.g., hypothyroid, seizures) _____

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

- * Headache that worsens
- * Repeated vomiting
- * Focal neurologic signs
- * Looks very drowsy/ can't be awakened
- * Can't recognize people or places
- * Weakness or numbness in arms/legs
- * Neck pain
- * Increasing confusion or irritability
- * Change in state of consciousness
- * Unusual behavioral change

E. Diagnosis (ICD): Concussion w/ LOC 850.0 Concussion w/ LOC 850.1 Concussion (Unspecified) 850.9 Other (854) _____
 No diagnosis

F. Follow-Up Action Plan Complete ACE Care Plan and provide copy to patient/family.

No Follow-Up Needed
 Physician/ Clinician Office Monitoring: Date of next follow-up _____
Referral:
 Neuropsychological Testing
 Physician: Neurosurgery _____ Neurology _____ Sports Medicine _____ Psychiatrist _____ Psychologist _____ Other _____
 Emergency Department



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: Concus-

knowledge of the patient's post-injury status. Without the pediatrician's active and informed involvement, service coordination is not likely to be as effective, result-

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, PhD¹ & Micky Collins, PhD²

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

Patient Name _____

DOB: _____ Age: _____

Date: _____ ID/MR# _____

A. Injury Characteristics

Date/Time of Injury _____ Reporter: Patient Parent Spouse Other _____

1. Injury Description _____

- 1a. Is there evidence of a forcible 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 Lt Temporal Rt Temporal Lt Parietal Rt Parietal Occipital Neck Indirect Force
 2. Cause: MVC Pedestrian-MVC Fall Assault Sports (specify) _____ Other _____
 3. **Amnesia Before (Retrograde)** Are there any events just BEFORE the injury that you/ person has no memory of (even brief)? Yes No Duration _____
 4. **Amnesia After (Anterograde)** Are there any events just AFTER the injury that you/ person has no memory of (even brief)? Yes No Duration _____
 5. **Loss of Consciousness:** Did you/ 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? No Yes Detail _____

B. Symptom Check List⁴

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). ⁴Lovell & Collins, 1998 JHTR

PHYSICAL (10)		COGNITIVE (4)		SLEEP (4)	
Headache	0 1	Feeling mentally foggy	0 1	Drowsiness	0 1
Nausea	0 1	Feeling slowed down	0 1	Sleeping less than usual	0 1 N/A
Vomiting	0 1	Difficulty concentrating	0 1	Sleeping more than usual	0 1 N/A
Balance problems	0 1	Difficulty remembering	0 1	Trouble falling asleep	0 1 N/A
Dizziness	0 1	COGNITIVE Total (0-4)		SLEEP Total (0-4)	
Visual problems	0 1	EMOTIONAL (4)		Exertion: Do these symptoms worsen with: Physical Activity <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A Cognitive Activity <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A Overall Rating: How different is the person acting compared to his/her usual self? (circle) Normal 0 1 2 3 4 5 6 Very Different	
Fatigue	0 1	Irritability	0 1		
Sensitivity to light	0 1	Sadness	0 1		
Sensitivity to noise	0 1	More emotional	0 1		
Numbness/Tingling	0 1	Nervousness	0 1		
PHYSICAL Total (0-10)		EMOTIONAL Total (0-4)			
(Add Physical, Cognitive, Emotion, Sleep totals) Total Symptom Score (0-22)					

C. Risk Factors for Protracted Recovery (check all that apply)

Concussion History? Y N	Headache History? Y N	Developmental History	Psychiatric History
Previous # 1 2 3 4 5	Prior treatment for headache	Learning disabilities	Anxiety
Longest symptom duration Days _____ Weeks _____ Months _____ Years _____	History of migraine headache ___ Personal ___ Family	Attention-Deficit/ Hyperactivity Disorder	Depression
If multiple concussions, less force caused reinjury? Yes ___ No ___		Other developmental disorder _____	Sleep disorder
			Other psychiatric disorder

List other comorbid medical disorders or medication usage (e.g., hypothyroid, seizures) _____

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

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

E. Diagnosis (ICD): Concussion w/ LOC 850.0 Concussion w/ LOC 850.1 Concussion (Unspecified) 850.9 Other (854) _____

No diagnosis

F. Follow-Up Action Plan Complete ACE Care Plan and provide copy to patient/family.

- 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



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

A. Injury Characteristics	Date/Time of Injury <u>May 30, 2017</u>	Reporter: <input type="checkbox"/> Patient <input checked="" type="checkbox"/> Parent <input type="checkbox"/> Spouse <input type="checkbox"/> Other
1. Injury Description	<u>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</u>	
1a. Is there evidence of a forcible blow to the head (direct or indirect)?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown	
1b. Is there evidence of intracranial injury or skull fracture?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Unknown	
1c. Location of Impact:	<input type="checkbox"/> Frontal <input type="checkbox"/> Lft Temporal <input type="checkbox"/> Rt Temporal <input type="checkbox"/> Lft Parietal <input type="checkbox"/> Rt Parietal <input checked="" type="checkbox"/> Occipital <input type="checkbox"/> Neck <input type="checkbox"/> Indirect Force	
2. Cause:	<input type="checkbox"/> MVC <input type="checkbox"/> Pedestrian-MVC <input type="checkbox"/> Fall <input checked="" type="checkbox"/> Assault <input type="checkbox"/> Sports (specify) _____ Other _____	
3. Amnesia Before (Retrograde) Are there any events just BEFORE the injury that you/ person has no memory of (even brief)?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Duration _____
4. Amnesia After (Anterograde) Are there any events just AFTER the injury that you/ person has no memory of (even brief)?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Duration _____
5. Loss of Consciousness: Did you/ person lose consciousness?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Duration _____
6. EARLY SIGNS: <input checked="" type="checkbox"/> Appears dazed or stunned <input checked="" type="checkbox"/> Is confused about events <input checked="" type="checkbox"/> Answers questions slowly <input type="checkbox"/> Repeats Questions <input type="checkbox"/> Forgetful (recent info)		
7. Seizures: Were seizures observed? No <input checked="" type="checkbox"/> Yes _____	Detail _____	

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

PHYSICAL (10)		COGNITIVE (4)		SLEEP (4)		
Headache	0 (1)	Feeling mentally foggy	0 (1)	Drowsiness	0 (1)	
Nausea	0 (1)	Feeling slowed down	0 (1)	Sleeping less than usual	0 1	N/A
Vomiting	0 1	Difficulty concentrating	0 (1)	Sleeping more than usual	0 (1)	N/A
Balance problems	0 (1)	Difficulty remembering	0 1	Trouble falling asleep	0 1	N/A
Dizziness	0 (1)	COGNITIVE Total (0-4)	3	SLEEP Total (0-4)	1	
Visual problems	0 (1)	EMOTIONAL (4)				
Fatigue	0 (1)	Irritability	0 (1)	Exertion: Do these symptoms <u>worsen</u> with: Physical Activity <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A Cognitive Activity <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		
Sensitivity to light	0 (1)	Sadness	0 1			
Sensitivity to noise	0 1	More emotional	0 1	Overall Rating: How <u>different</u> is the person acting compared to his/her usual self? (circle) Normal 0 1 2 (3) 4 5 6 Very Different		
Numbness/Tingling	0 1	Nervousness	0 1			
PHYSICAL Total (0-10)	7	EMOTIONAL Total (0-4)	1			
(Add Physical, Cognitive, Emotion, Sleep totals)			11			
Total Symptom Score (0-22)						

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.



Acute Concussion Evaluation (ACE)

C. Risk Factors for Protracted Recovery

C. Risk Factors for Protracted Recovery (check all that apply)						
Concussion History? Y <input checked="" type="checkbox"/> N <input type="checkbox"/>	✓	Headache History? Y <input checked="" type="checkbox"/> N <input type="checkbox"/>	✓	Developmental History	✓	Psychiatric History
Previous # <u>1</u> 2 3 4 5		Prior treatment for headache		Learning disabilities		Anxiety
Longest symptom duration Days__ Weeks <u>1</u> Months__ Years__	✓	History of migraine headache __ Personal <input checked="" type="checkbox"/> Family _____		<input checked="" type="checkbox"/> Attention-Deficit/ Hyperactivity Disorder		Depression
If multiple concussions, less force caused reinjury? Yes__ No__		_____		Other developmental disorder _____		Other psychiatric disorder _____
List other comorbid medical disorders or medication usage (e.g., hypothyroid, seizures) _____						

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)

S06.0X1A (Concussion, with brief loss of consciousness < 1 hour)

- No evidence of LOC (A5)
- Positive injury description, evidence of forcible direct/ indirect blow to the head (A1a)
- No skull fracture or intracranial injury (A1b), such as from neuroimaging or
- Evidence of active symptoms (B) related to the trauma (Total Symptom Score >0)
- **LOC > 1 hour**
- **Positive evidence of LOC details; unclear evidence of LOC (A5)**
- **Moderate TBI** diagnostic code **S06.2X0 (Diffuse TBI, no LOC)** should be considered.



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

Minutes/Hours

Alteration of consciousness
or mental/ neurologic status

Post-Concussion Signs & Symptoms

<u>Physical</u>	<u>Cognitive</u>	<u>Emotional</u>	<u>Sleep</u>
Headache	Concentrate	Irritability	More
Fatigue	Memory	Emotional	Less
Balance/ Dizziness	Speed of Thinking	control Sadness	Cannot



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.

No Follow-Up Needed

Physician/Clinician Office Monitoring: Date of next follow-up June 7, 2017

Referral:

Neuropsychological Testing

Physician: Neurosurgery ___ Neurology ___ Sports Medicine ___ Physiatrist ___ Psychiatrist ___ Other _____

Emergency Department

ACE Completed by: _____ MD RN NP PhD ATC

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This form is part of the "Heads Up: Brain Injury in Your Practice" toolkit developed by the Centers for Disease Control and Prevention (CDC).

None

Office Monitor (Re-Assess in 1-2 days)

Referral: Testing, MD, ED



Children's National

Primary Care Clinical Pathway

First Office Visit

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

Managing Concussion Recovery



ACUTE CONCUSSION EVALUATION (ACE)

Physician/Clinician Office Version
 Gerard Giola, PhD¹ & Micky Collins, PhD²
¹Children's National Medical Center
²University of Pittsburgh Medical Center

Patient Name _____
 DOB: _____ Age: _____
 Date: _____ ID#/I _____

ACUTE CONCUSSION EVALUATION (ACE)

CARE PLAN

Gerard Giola, PhD¹ & Micky Collins, PhD²
 Children's National Medical Center
 University of Pittsburgh Medical Center

Patient Name _____
 DOB: _____ Age: _____
 Date: _____ ID/MR# _____
 Date of Injury: _____

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.

A. Injury Characteristics Date/Time of Injury _____ Reporter: ___ Patient ___ Parent ___ Sp _____

- Injury Description** _____
- 1a. Is there evidence of a forcible 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 ___ Lt Temporal ___ Rt Temporal ___ Lt Parietal ___ Rt Parietal ___ Occipital ___ Neck ___ Indir _____
2. **Cause:** ___ MVC ___ Pedestrian-MVC ___ Fall ___ Assault ___ Sports (specify) _____ Other _____
3. **Amnesia Before (Retrograde)** Are there any events just BEFORE the injury that you/ person has no memory of (even brief)? ___ Y ___ N
4. **Amnesia After (Anterograde)** Are there any events just AFTER the injury that you/ person has no memory of (even brief)? ___ Y ___ N
5. **Loss of Consciousness:** Did you/ person lose consciousness? ___ Y ___ N
6. **EARLY SIGNS:** ___ Appears dazed or stunned ___ Is confused about events ___ Answers questions slowly ___ Repeats Questions
7. **Seizures:** Were seizures observed? No ___ Yes ___ Detail _____

B. Symptom Check List* Since the injury, has the person experienced any of these symptoms any more than _____

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

PHYSICAL (10)		COGNITIVE (4)		SLEEP (4)	
Headache	0 1	Feeling mentally foggy	0 1	Drowsiness	0 1
Nausea	0 1	Feeling slowed down	0 1	Sleeping less than usual	0 1
Vomiting	0 1	Difficulty concentrating	0 1	Sleeping more than usual	0 1
Balance problems	0 1	Difficulty remembering	0 1	Trouble falling asleep	0 1
Dizziness					
Visual					
Fatig					
Sens					
Sens					
Numt					
PHYS					

Today the following symptoms are present (circle or check). _____ No reported symptoms

Physical	Thinking	Emotional	Sleep
Sensitivity to light	Feeling mentally foggy	Irritability	Drowsiness
Sensitivity to noise	Problems concentrating	Sadness	Sleeping more than usual
Fatigue	Problems remembering	Feeling more emotional	Sleeping less than usual
Visual problems	Vomiting	Nervousness	Trouble falling asleep
Balance Problems	Dizziness		

RED FLAGS: Call your doctor or go to your emergency department if you suddenly experience any of the following

Linking Diagnosis With Treatment

C. Risk Factors for Protracted Recovery (check all that apply)

Concussion History? Y ___ N ___	Headache History? Y ___ N ___	Developmental History
Previous # 1 2 3 4 5	Prior treatment for headache	Learning disabilities
Longest symptom duration Days ___ Weeks ___ Months ___ Years ___	History of migraine headache ___ Personal ___ Family	Attention-Deficit Hyperactivity Disorder
If multiple concussions, less force caused reinjury? Yes ___ No ___		Other developmental disorder

List other comorbid medical disorders or medication usage (e.g., hypothyroid, seizures) _____

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
- * Neck pain
- * Seizures
- * Repeated vomiting
- * Increasing confusion or irritability
- * Unusual behavior
- * Focal neurologic signs
- * Slurred speech
- * Weakness or numbness in arms/legs
- * Change in state

E. Diagnosis (ICD): ___ Concussion w/ LOC 850.0 ___ Concussion w/ LOC 850.1 ___ Concussion (Unspecified) 850.9 ___ Other ___ No diagnosis

F. Follow-Up Action Plan Complete ACE Care Plan and provide copy to patient/family.

- ___ 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

2. Take daytime naps or rest breaks when you feel tired or fatigued.
3. Limit physical activity as well as activities that require a lot of thinking or concentration. These activities can make symptoms worse.
 - * Physical activity includes PE, sports practices, weight-training, running, exercising, heavy lifting, etc.
 - * Thinking and concentration activities (e.g., homework, classwork load, job-related activity).
4. Drink lots of fluids and eat carbohydrates or protein every 3-4 hours to main appropriate blood sugar levels.
5. As symptoms decrease, you may begin to gradually return to your daily activities. If symptoms worsen or return, lessen your activities, then try again to increase your activities gradually.
6. During recovery, it is normal to feel frustrated and sad when you do not feel right and you can't be as active as usual.
7. Repeated evaluation of your symptoms is recommended to help guide recovery.

Returning to School

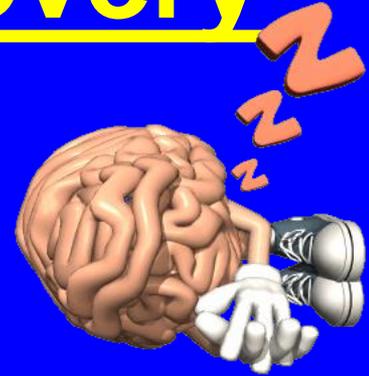
1. If you (or your child) are still having symptoms of concussion you may need extra help to perform school-related activities. As your (or your child's) symptoms decrease during recovery, the extra help or supports can be removed gradually.
2. Inform the teacher(s), school nurse, school psychologist or counselor, and administrator(s) about your (or your child's) 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 able to cope with stress
 - * Symptoms worsen (e.g., headache, tiredness) when doing schoolwork

-Continued on back page-

This form is part of the "Head Up: Brain Injury in Your Practice" tool kit 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)

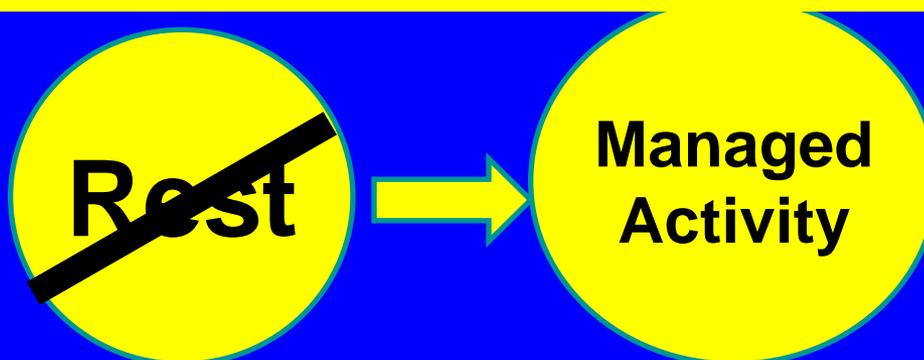
(Emotional)



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.



Patient / Family Education

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.

When Should My Child Return to the Hospital Emergency Department?

Sometimes serious problems develop after a head injury. If your child has any symptoms that concern you, don't delay, call 911. Worrisome signs or symptoms include:

- A headache that gets worse and does not go away
- Significant nausea or repeated vomiting
- Unusual behavior, increased confusion, restlessness, or agitation
- Drowsiness or inability to wake up
- Slurred speech, weakness, numbness, or decreased coordination
- Convulsions or seizures (shaking or twitching)

THINKING/REMEMBERING

Difficulty thinking

Feeling slowed

Difficulty

Difficulty remembering

What to Do After A Concussion

Patient Take-Home Instructions Information for Families & Children

STEP 2: LIGHT ACTIVITY

As you start to feel better, you can gradually return to your regular activities.

- 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).

STEP 3: MODERATE ACTIVITY

When symptoms are mild and nearly gone you can return to most of your regular activities.

- Help your child take breaks only if their concussion symptoms worsen.
- They can return to their regular school and work (if relevant) schedule.

STEP 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

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.

PHYSICAL		COGNITIVE	EMOTIONAL
<input checked="" type="checkbox"/> Headaches	<input checked="" type="checkbox"/> Fatigue	<input checked="" type="checkbox"/> Feeling mentally foggy	<input checked="" type="checkbox"/> Irritability
<input checked="" type="checkbox"/> Sensitivity to light	<input type="checkbox"/> Sensitivity to noise	<input checked="" type="checkbox"/> Memory problems	<input type="checkbox"/> Anxiety/ nervousness
<input checked="" type="checkbox"/> Blurry/double vision	<input checked="" type="checkbox"/> Nausea/ vomiting	<input checked="" type="checkbox"/> Slowed thinking/ performance	<input type="checkbox"/> Sadness
<input checked="" type="checkbox"/> Balance Problems	<input checked="" type="checkbox"/> Dizziness	<input checked="" type="checkbox"/> Difficulty concentrating	<input type="checkbox"/> Feeling more emotional

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:

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

Follow Up Visit

3

Office Visit - Follow Up
(Weekly)

Monitor symptoms, exertional response to management

Home Management

School progress update

Post-Concussion Symptom Inventory-PCSI (Parent, Student)

ACE Care Plan

School Symptom Monitor

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

Name: _____ Today's date: _____ Birthdate: _____ Age _____ Grade: _____

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.

		2 = A lot			Before the Injury /Pre-Injury			Current Symptoms/ Yesterday and Today			
		0	1	2	0	1	2	0	1	2	
Age 5-7: Only 5 items											
Age 8-12: 17 items											
1	Have you had headaches? Has your head hurt?	0	1	2	0	1	2	0	1	2	
2	Have you felt sick to your stomach or nauseous?	0	1	2	0	1	2	0	1	2	
3	Have you felt dizzy? (like things around you were spinning or moving)	0	1	2	0	1	2	0	1	2	
4	Have you felt grumpy or irritable? (like you were in a bad mood)	0	1	2	0	1	2	0	1	2	
5	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)	0	1	2	0	1	2	0	1	2	
<i>Continue if age 8 or older</i>											
6	Have you felt more drowsy or sleepy <u>than usual</u> ?	0	1	2	0	1	2	0	1	2	
7	Have bright lights bothered you <u>more than usual</u> ? (like when you were in the sunlight, when you looked at lights, or watched TV)	0	1	2	0	1	2	0	1	2	
8	Have loud noises bothered you <u>more than usual</u> ? (like when people were talking, when you heard sounds, watched TV, or listened to loud music)	0	1	2	0	1	2	0	1	2	
9	Have you had any balance problems or have you felt like you might fall when you walk, run or stand?	0	1	2	0	1	2	0	1	2	
10	Have you felt sad?	0	1	2	0	1	2	0	1	2	
11	Have you felt nervous or worried?	0	1	2	0	1	2	0	1	2	
12	Have you felt like you are moving more slowly?	0	1	2	0	1	2	0	1	2	
13	Have you felt like you are thinking more slowly?	0	1	2	0	1	2	0	1	2	
14	Has it been hard to think clearly?	0	1	2	0	1	2	0	1	2	

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

Post-Concussion Symptom Inventory

Ages 13-18 (PCSI-SR13)

Pre/Post Version

Patient Name: _____

Today's date: _____

Birthdate: _____

Age: _____

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.

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

		Before the Injury/ Pre-Injury							Current Symptoms/ Yesterday and Today						
1	Headache	0	1	2	3	4	5	6	0	1	2	3	4	5	6
2	Nausea	0	1	2	3	4	5	6	0	1	2	3	4	5	6
3	Balance problems	0	1	2	3	4	5	6	0	1	2	3	4	5	6
4	Dizziness	0	1	2	3	4	5	6	0	1	2	3	4	5	6
5	Visual problems (double vision, blurring)	0	1	2	3	4	5	6	0	1	2	3	4	5	6
6	Move in a clumsy manner	0	1	2	3	4	5	6	0	1	2	3	4	5	6
7	Sensitivity to light	0	1	2	3	4	5	6	0	1	2	3	4	5	6
8	Sensitivity to noise	0	1	2	3	4	5	6	0	1	2	3	4	5	6
	[Office Use Only] Physical	Total Pre=							Total Post=						
9	Irritability	0	1	2	3	4	5	6	0	1	2	3	4	5	6
10	Sadness	0	1	2	3	4	5	6	0	1	2	3	4	5	6
11	Nervousness	0	1	2	3	4	5	6	0	1	2	3	4	5	6
	[Office Use Only] Emotional	Total Pre=							Total Post=						
		0	1	2	3	4	5	6	0	1	2	3	4	5	6
14	Difficulty concentrating	0	1	2	3	4	5	6	0	1	2	3	4	5	6

Adjusted Sx Score =
Post – Pre-Injury

Post-Concussion Symptom Inventory

Parent - Ages 5 to 18 (PCSI-P)

Pre/Post Version

Student's Name: _____

Today's date: _____

Birthdate: _____

Age/ Grade: _____

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

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

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

Name: _____

Age: _____

Date of birth: _____

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

Physical		Cognitive	Emotional	Sleep
Headaches	Sensitivity to light	Feeling mentally foggy	Irritability	Drowsiness
Fatigue	Sensitivity to noise	Problems concentrating	Sadness	Sleeping more than usual
Visual problems	Nausea	Problems remembering	Feeling more emotional	Sleeping less than usual
Dizziness	Vomiting	Feeling more slowed down	Nervousness	Trouble falling asleep
Balance Problems	Numbness/ tingling	Other:		

**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. But be sure to not 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.

Work-Rest-Work-Rest

KEY POINTS

Returning to School

KEY POINTS



Returning to Physical Activities

- **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:

Day/ date*

Physical Exertional Activity (NON-CONTACT ONLY)

1. **Low levels** of physical exertion that may include walking, light stationary biking, light weightlifting (lower weight, higher reps, no bench, no squat).

2. **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).

3. **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).

* 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 health care provider know, and reduce activities to the previous level.

KEY POINTS



Returning to Sports/ Physical Education

- **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 health care 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:

Event	Action	Tools	Communication
4a Office Visit - Clearance	<p>Assess for full recovery</p> <ol style="list-style-type: none"> 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 	<p><i>*PCSI (Student, Parent)</i></p> <p><i>*Medical Clearance for Gradual Return -- Full Return follows completion of grad RTP program</i></p> <p><i>*Gradual Return to Sport guide</i></p>	<p>To Family: Counsel on gradual return process</p> <p>To School: Clearance to return to PE/recess</p> <p>To Sport: Clearance to begin gradual Return to Play protocol; monitor until Final Clearance</p>

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



When Recovery is complicated...

Event	Action	Tools	Communication
Referral Criteria for 4b Prolonged/ Complicated Recovery	Symptom Assessment: patient not making appropriate recovery progress or complicated history; refer to concussion specialist for consultation/ management	Specialist Referral Criteria	To Family: Discuss referral to specialist, make referral to concussion clinic

When F

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 w 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

