Updates from the CDC Pediatric mTBI Guideline

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Disclosures

• No conflicts of interest to disclose
• Co-investigator on the U.S. Department of Defense-funded Brain Trauma Evidence Based Consortium (B-TEC)
## Objectives

<table>
<thead>
<tr>
<th>Summarize</th>
<th>Review</th>
<th>Discuss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summarize the CDC Pediatric mTBI Guideline development process</td>
<td>New key Guideline recommendations</td>
<td>Tools and case-based examples for guideline implementation</td>
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Pediatric Mild Traumatic Brain Injury

Facts:

• Affecting millions of children annually
• A minority (10%) present to the ED
• Wide varieties in care among general practitioners and specialists
• 30% of children will have symptoms lasting beyond one month post-injury
• Falls are the most common etiology of concussion in children
SNAPSHOT: CDC Pediatric mTBI Guideline

The Guideline is:

• Most comprehensive review of pediatric mTBI scientific evidence to date—*summarizing 25 years of scientific research*

• Only U.S. evidence-based clinical recommendations for healthcare providers that:
  – Cover all causes of pediatric mTBI
  – Include guidance for:
    o Primary care
    o Outpatient specialty
    o Inpatient care
    o Emergency care settings
Methodology

• Systematic review and Guideline were developed using methods of the American Academy of Neurology
• Process compliant with the 2010 standards of the National Academy of Sciences
Six Clinical Questions

1. For children with suspected mTBI, do specific tools, as compared with a reference standard, accurately diagnose mTBI?
2. For children presenting to the ED (or other acute care setting) with mTBI, how often does routine head imaging identify important intracranial injury?
3. For children presenting to the ED (or other acute care setting) with mTBI, which features identify patients at risk for important intracranial injury?
4. For children with mTBI, what factors identify patients at increased risk for ongoing impairment, more severe symptoms, or delayed recovery (< 1 year post-injury)?
5. For children with mTBI, which factors identify patients at increased risk of long-term (≥ 1 year) sequelae?
6. For children with mTBI (with ongoing symptoms), which treatments improve mTBI-related outcomes?
DATA ANALYSIS and SYSTEMATIC REVIEW
SNAPSHOT: Data Analysis

Across all six clinical questions:
• **More than 37,000** abstracts reviewed
• **Almost 2,900** full-text articles reviewed
• **More than 340** articles underwent data extraction
• **Almost 100 articles** included in the qualitative synthesis
Rating the Evidence

• Findings from the literature review and data abstraction were compiled into evidence tables.

• To judge overall confidence in the evidence, the Workgroup used a modified GRADE process. This process explicitly considered:
  • Risk of bias in individual studies (class of evidence)
  • Consistency between studies
  • Precision, directness, and magnitude of effect relative to the risk of bias
  • Presence of an expected dose-response relationship
  • Direction of bias
Rating the Evidence (continued)

• The risk of bias in each study was determined using the classification of evidence scheme for:
  – Screening
  – Diagnostic
  – Prognostic
  – Therapeutic questions

• All articles were reviewed and abstracted by a minimum of two independent experts at each phase, requiring consensus for inclusion

• Evidence tables were constructed from abstracted study characteristics
CLINICAL RECOMMENDATIONS for HEALTHCARE PROVIDERS
Development Process

• Developed based on the evidence established by the:
  – Systematic review
  – Related evidence
  – Scientific principles
  – Expert consensus inference

• Four rounds of voting to determine consensus using a modified Delphi process
  – To be accepted/reach consensus, 80% of the group were required to be in consensus
SNAPSHOT: Clinical Recommendations

- **19 recommendations sets** covering diagnosis, prognosis, and management and treatment

- Five practice-changing recommendations:
  1. **No routine imaging** of patients with suspected mTBI for diagnostic purposes
  2. Use validated, age-appropriate **symptom scales** to diagnose mTBI
  3. Assess evidence-based **risk factors for prolonged recovery**
  4. Provide patients with instructions on return to activity **customized to their symptoms**
  5. Counsel patients to return gradually to non-sports activities after no more than a **2-3 days of rest**
Getting this Information into Practice
Development of Implementation Tools

1. Translate the key findings from the guideline into educational products tailored specifically for the target audiences.

2. Conduct formative testing on the content and design of the materials.

3. Launch the implementation tools in coordination with the CDC guideline.

4. Work with partner organizations to disseminate and integrate the materials and messages into their existing systems and programs.
Implementation Tools

For Healthcare Providers

- Checklist on diagnosis and management
- Screening/Assessment tools (acute and primary care setting)
- Online training with continuing education opportunity -- new
- EHR module (if possible) -- new
- At-a-glances (overview of key recommendations) -- new

For Parents

- Discharge instructions -- new
- Symptom-based recovery tips handout -- new
- Existing CDC HEADS UP content (see next slide)
Implementation Tools

For School Professionals

- Letter to schools to be filled in by healthcare providers--new
- Existing CDC HEADS UP to Schools materials:
  - Return to School handout
  - Classroom-based strategies for teachers
  - Fact sheets for school nurses, teachers and counselors, and parents
  - Signs and symptoms checklist for school nurses
  - Posters and laminated information cards

For Sports Coaches

- Existing CDC HEADS UP concussion in sports materials:
  - Online trainings
  - Fact sheets for coaches, parents, and athletes
  - Mobile phone apps:
    - Concussion and helmet safety app
    - Gaming app for young children
  - Sports-specific prevention messages and posters--new
  - Videos

Videos
Caring for Your Child’s Concussion
Your child was seen today for a concussion. Use this handout to help you watch for changes in how your child is feeling or acting, and to help your child feel better.

What is a Concussion?
A concussion is a type of traumatic brain injury from a bump, blow, or jolt to the head or body that causes:
- The head and brain to move quickly back and forth.
- The brain to bounce or twist in the skull from this sudden movement.
- Chemical changes in the brain, and sometimes stretching and damage to the brain cells.

How Will My Child Feel?
Concussion symptoms may appear during the normal healing process, and will generally improve over time. Most people with a concussion feel better within a couple of weeks. Some symptoms may appear right away, while other symptoms may not appear for hours or days after the injury. Your child may not realize they have some symptoms until they try to do their usual activities. You may notice changes before your child does. If there are any symptoms that concern you, or are getting worse, your child may need immediate care. Be sure to talk with your child's doctor.

Here are symptoms your child may have:

**Physical**
- Bothered by light or noise
- Dizziness or balance problems
- Feeling tired, no energy
- Headaches
- Nausea or vomiting (early on)
- Vision problems

**Thinking or Remembering**
- Attention or concentration problems
- Feeling slowed down
- Foggy or groggy
- Problems with short- or long-term memory
- Trouble thinking clearly

**Social or Emotional**
- Anxiety or nervousness
- Irritability or easily angered
- Feeling more emotional
- Sadness

**Sleep**
- Sleeping less than usual
- Sleeping more than usual
- Trouble falling asleep

What Steps Can I Take to Help My Child Feel Better?

1. Rest Right After the Injury
   - Take it easy the first few days after the injury when symptoms are more severe.
   - Early on, limit physical and cognitive (thinking or remembering) activities to avoid causing symptoms to worsen.
   - Get a good night’s sleep, and take naps during the day as needed.
   - Find relaxing activities at home (such as reading, drawing, and playing with toys). Avoid activities that put your child at risk for another injury to the head and brain throughout the course or recovery.

2. Within a Few Days
   - As your child starts to feel better (and within a few days after the injury), he or she can gradually return to regular (non-strenuous) activities.
   - Return to school gradually. If symptoms do not worsen during an activity, then this activity is OK for your child. If symptoms worsen, cut back on that activity until it is tolerated.
   - Encourage outside time, such as taking short walks.
   - Get maximum nighttime sleep. Tips: Avoid screen time and loud music before bed, sleep in a dark room, and keep to a fixed bedtime and wake up schedule.
   - Reduce daytime naps, or return to a regular daytime nap schedule (as appropriate for their age).

3. When Symptoms Are Nearly Gone
   - When symptoms are mild and nearly gone, return to most regular activities.
   - Have your child take breaks if their concussion symptoms worsen.
   - Return to a regular school schedule.
   - Encourage outside time, such as taking a walk or short bike ride and playground time.

4. Back to Regular Non-Sports Activities
   - Recovery from a concussion is when your child is able to do all of their regular activities without experiencing any concussion symptoms.
   - If you notice any changes or a return of symptoms, be sure to contact your child’s doctor.
   - With the OK from their doctor, your child may begin a return to sports process. Be sure to ask for instructions and share this information with your child’s coach and athletic trainer (when available).

Other Tips:
- Ask your child’s doctor about over-the-counter or prescription medications that are safe to take during recovery to help with symptoms (for example, ibuprofen or acetaminophen for headaches).
- Limit the number of soft drinks or caffeinated items to help your child get enough rest.

Scheduling a follow up appointment with your child’s doctor.

Cdc Heads Up
Safe Brain, Stronger Future.
How Can I Help My Child Recover After a Concussion?

This handout describes common concussion symptoms your child may experience, and tips you can use to help with their recovery.

Most children with a concussion, a type of traumatic brain injury, feel better within a couple of weeks. However, for some, symptoms will last for a month or longer. Concussion symptoms appear as part of the normal healing process and may change as your child gets back to his or her regular activities. If there are any symptoms that concern you, or are getting worse, be sure to seek medical care as soon as possible.

**CONCUSSION RECOVERY TIPS**

Making short-term changes to your child’s daily activities can help him or her get back to a regular routine more quickly. As your child begins to feel better, you can slowly remove these changes. Use your child’s symptoms to guide his or her return to normal activities. If your child’s symptoms do not worsen during an activity, then that activity is OK for them. If symptoms worsen, your child should cut back that activity.

It is important to remember that each concussion and each child is unique, so your child’s recovery should be customized based on his or her symptoms. Factors that may delay recovery include your child having a history of a previous concussion or other brain injury, neurological or mental health disorders, learning difficulties, or family and social stressors.

**Quick Tips**

- Ensure your child avoids activities that can put him or her at risk for another injury to the head and brain.
- Help your child keep a positive attitude. Most children with a concussion feel better within a couple of weeks.
- Ensure your child gets enough rest.

**Concussion Symptoms**

<table>
<thead>
<tr>
<th>Symptom</th>
<th>How Your Child May Feel or Act</th>
<th>Tips to Help with Your Child’s Recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attention or concentration</td>
<td>Only able to focus on school work for short amounts of time</td>
<td>• Shorten tasks&lt;br&gt;• Break down tasks into smaller activities or steps&lt;br&gt;• Lessen school workload or amount of activity&lt;br&gt;• Avoid cognitive activities (thinking or remembering) that can cause symptoms to worsen</td>
</tr>
<tr>
<td>problems</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short-term memory problems</td>
<td>Trouble remembering instructions or keeping information and ideas in mind during tasks</td>
<td>• Repeat directions or key information&lt;br&gt;• Provide written notes&lt;br&gt;</td>
</tr>
<tr>
<td>Long-term memory problems</td>
<td>Trouble with learning new information or remembering information already learned</td>
<td>• Repeat directions or key information&lt;br&gt;• Provide reminders, or tie information to familiar things, such as events, objects, or people&lt;br&gt;• Break down information into smaller chunks or pieces</td>
</tr>
<tr>
<td>Feeling slowed down</td>
<td>Unable to keep pace with workload&lt;br&gt;Slower reading, writing, or calculation&lt;br&gt;Difficulty processing verbal information effectively</td>
<td>• Talk with your child’s school about extending deadlines to complete homework, assignments, and tests&lt;br&gt;• Reduce or slow down how quickly information is presented and check for understanding throughout the activity</td>
</tr>
<tr>
<td>Foggy or groggy</td>
<td>Less mental energy&lt;br&gt;Trouble thinking clearly&lt;br&gt;Trouble formulating thoughts</td>
<td>• Provide rest breaks during activities throughout the day (at school or home)&lt;br&gt;• Set aside a quiet place at home for school work or other learning activities</td>
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**SOCIAL OR EMOTIONAL**

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<td>Irritability or easily angered</td>
<td>Trouble dealing with stress</td>
<td>• Look for opportunities to lessen the amount of stress your child may feel&lt;br&gt;• Provide a place for your child to take quiet rest breaks, as needed&lt;br&gt;• Do deep breathing exercises with your child&lt;br&gt;• Encourage your child to talk to a trusted adult or friend&lt;br&gt;• Remind your child that most people feel better soon after a concussion</td>
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Tips to Help with Your Child’s Recovery

www.cdc.gov/HEAdUSP
DEAR SCHOOL STAFF:

This letter offers input from a healthcare provider with experience in treating concussion, a type of traumatic brain injury. This letter was created to help school professionals and parents support students returning to school after a concussion. You can use these recommendations to make decisions about support for your student based on his or her specific needs. This letter is not intended to create a 504 Plan or an IEP unless school professionals determine that one is needed. Most students will only need short-term support as they recover from a concussion. A strong relationship between the healthcare provider, the school, and the parents will help your student recover and return to school.

[Student Name] was seen for a concussion on [Date] in [Office or clinic, Healthcare Provider’s Name]

The student is currently reporting the following symptoms:

- [ ] Physical
  - [ ] Headache
  - [ ] Nausea or vomiting
  - [ ] Vision problems

- [ ] Thinking or remembering
  - [ ] Attention or concentration problems
  - [ ] Feeling slowed down
  - [ ] Fatigued or groggy
  - [ ] Problems with short- or long-term memory
  - [ ] Trouble thinking clearly

- [ ] Social or emotional
  - [ ] Anxiety or nervousness
  - [ ] Irritable or easily angered
  - [ ] Feeling more emotional
  - [ ] Sadness

- [ ] Sleep
  - [ ] Sleeping less than usual
  - [ ] Sleeping more than usual
  - [ ] Trouble falling asleep

The student also reported these symptoms:

[ ]

[ ]

[ ]

[ ]

[ ]

[ ]

[ ]

Based on the student’s current symptoms, I recommend that the student:

[ ] Be permitted to return to school and activities while school professionals closely monitor the student. School professionals should observe and check in with the student for the first two weeks, and note if symptoms worsen. If symptoms do not worsen during an activity, then this activity is OK for the student. If symptoms worsen, the student should cut back on time spent engaging in that activity, and may need some short-term support at school. Tell the student to update his or her teachers and school counselor if symptoms worsen.

[ ] Is excused from school for [number] days.

[ ] Return to school with the following changes until his or her symptoms improve.

(Note: Making short-term changes to a student’s daily school activities can help him or her return to a regular routine more quickly. As the student begins to feel better, you can slowly remove these changes.)

Based on the student’s symptoms, please make the short-term changes checked below:

[ ] No physical activity during recess
[ ] No physical education (PE) class
[ ] No after school sports
[ ] Shorten school day
[ ] Later school start time
[ ] Reduce the amount of homework
[ ] Postpone classroom tests or standardized testing
[ ] Provide extended time to complete school work, homework, or take tests
[ ] Provide written notes for school lessons and assignments (when possible)

[ ] Allow for a quiet place to take rest breaks throughout the day
[ ] Lessen the amount of screen time for the student, such as on computers, tablets, etc.
[ ] Give ibuprofen or acetaminophen to help with headaches (as needed)
[ ] Allow the student to wear sunglasses, earplugs, or headphones if bothered by light or noise

[ ] Other:

[ ]

[ ]

Most children with a concussion feel better within a couple of weeks. However, for some, symptoms can last for a month or longer. If there are any symptoms that concern you, or are getting worse, notify the student’s parents that the student should be seen by a healthcare provider as soon as possible.

For information on helping students return to school safely after a concussion, visit www.cdc.gov/HEADSUP.
GOAL OF THE CDC mTBI GUIDELINE

The goal of the CDC Pediatric Mild Traumatic Brain Injury (mTBI) Guideline is to help healthcare providers take action to improve the health of their pediatric patients with mTBI. To do this, the Guideline consists of 19 clinical recommendations that cover diagnosis, prognosis, and management and treatment. These recommendations are applicable to healthcare providers working in inpatient, emergency, primary, and outpatient care settings.

The Guideline was developed through a rigorous process guided by the American Academy of Neurology methodology and 2010 National Academy of Sciences methodology for the development of evidence-based guidelines. An extensive review of scientific literature, spanning 25 years of research, formed the basis of the Guideline.

mTBI in children

Children's developing brains are more vulnerable to mTBI because:

- Their axes are not as well-mediactated.
- They are more susceptible to chemical and metabolic changes.

RECOMMENDATIONS FOR THE DIAGNOSIS OF mTBI

Six sets of diagnostic recommendations are included in the Guideline. These recommendations focus on:

- Neuroimaging
- Neuropsychological tools
- Serum Biomarkers
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mTBI in children
Symptoms of mTBI generally fall into four categories:
• Somatic  • Cognitive  • Mood/Affective  • Sleep

Symptom resolution:
30% Experience symptoms one-month post-injury
10% Experience symptoms three-months post-injury
5% Experience symptoms one-year post-injury

RECOMMENDATIONS FOR THE PROGNOSIS OF mTBI

Five sets of prognostic recommendations are included in the Guideline. These recommendations focus on:

- Counseling patients on prognosis
- Evaluating for premorbid conditions
- Assessing for risk factors
- Use of tools for predicting prognosis
- Interventions for poor prognosis
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mTBI in children

While most have a good recovery, some children experience both acute and long-term problems that affect them:

Physically  Cognitively  Psychologically

RECOMMENDATIONS FOR TREATMENT AND MANAGEMENT OF mTBI

Eight sets of management and treatment recommendations are included in the Guideline. These recommendations focus on:

- General areas of treatment for patients and families
- Symptom and problem-specific treatments
Case-Based Examples from the ED and Stanford Concussion Center
Clinical Scenario

The 6 year old on the monkey bars
Identify

• Validated decision rules assessing a combination of risk factors should be used to assess the likelihood of mTBI prior to obtaining CT imaging.

• Mild TBI is a clinical diagnosis and is not dependent on head CT imaging or skull x-rays. Additionally, skull x-rays should not be used as a screening tool for intracranial injury.
Closed Head Injury Algorithm ≥ 2 years

GCS < 15
Other signs of altered mental status
  Agitation
  Somnolence
  Repetitive questioning
  Slow response to verbal communication
  Signs of a basilar skull fracture

  Yes → CT recommended

  No

History of LOC
Vomiting
Severe headache
Severe mechanism of injury
  MVC if ejected, death of passenger, rollover
  Pedestrian struck by motor vehicle
  Bicyclist without helmet struck by MV
  Falls more than 3 feet
  Head struck by high-impact object

  Yes → Observation vs. CT on the basis of other factors including:
  Physician experience
  Multiple vs. isolated findings
  Worsening signs or symptoms after observation in ED
  Parental preference

  No → CT not recommended
Clinical Scenario

The 17 year old athlete that wants to go back into play
ACUTE CONCUSSION EVALUATION (ACE)
PHYSICIAN/CLINICIAN OFFICE VERSION

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

A. Injury Characteristics

Date/Time of injury: ______________________ Report by:__ Patient Parent Spouse Other:

1. Injury Description

1a. Is there evidence of a head injury (closed or indirect)? __Yes__ _No__ Unknown
1b. Is there evidence of intracranial injury or skull fracture? __Yes__ _No__ Unknown
1c. Location of impact: __Frontal__ __Temporal__ __Occipital__ __Parietal__ __Basal__ __Jaw__ __Indirect Force
2. Cause: __Motor Vehicle __Fell __Assault __Sports injury __Other

3. Associated Data:
3a. Are there any events just BEFORE the injury that you or your partner has memory of (even briefly)? __Yes__ _No__ Duration: __Day__ __Hour__ __Minute__
3b. Are there any events just AFTER the injury that you or your partner has memory of (even briefly)? __Yes__ _No__ Duration: __Day__ __Hour__ __Minute__

4. Loss of Consciousness: __Yes__ _No__ Duration: __Day__ __Hour__ __Minute__

5. EARLY SIGNS: __Yes__ _No__ __Unknown__ __Indeterminate__ __Not answered__ Questions: __Yes__ _No__ __Unknown__ __Indeterminate__ Questions: ____________________________

6. Neurological: __Yes__ _No__ __Unknown__ __Indeterminate__ __Not answered__

7. Headache: __Yes__ _No__ _Unknown__ __Indeterminate__ __Not answered__

8. Nausea: __Yes__ _No__ _Unknown__ __Indeterminate__ __Not answered__

9. Vomiting: __Yes__ _No__ _Unknown__ __Indeterminate__ __Not answered__

10. Balance problems: __Yes__ _No__ _Unknown__ __Indeterminate__ __Not answered__

11. Dizziness: __Yes__ _No__ _Unknown__ __Indeterminate__ __Not answered__

12. Visual problems: __Yes__ _No__ _Unknown__ __Indeterminate__ __Not answered__

13. Fatigue: __Yes__ _No__ _Unknown__ __Indeterminate__ __Not answered__

14. Illness: __Yes__ _No__ _Unknown__ __Indeterminate__ __Not answered__

15. Sensitivity to light: __Yes__ _No__ _Unknown__ __Indeterminate__ __Not answered__

16. Sensitivity to noise: __Yes__ _No__ _Unknown__ __Indeterminate__ __Not answered__

17. Numbness Tingling: __Yes__ _No__ _Unknown__ __Indeterminate__ __Not answered__

PHYSICAL (10) COGNITIVE (4) SLEEP (4)

18. Headache 0 1 Feeling/mentality foggy 0 1 Drowsiness 0 1
19. Nausea 0 1 Feeling/nausea 0 1 Sleeping less than usual 0 1 NA
20. Vomiting 0 1 Difficulty concentrating 0 1 Sleeping more than usual 0 1 NA
21. Balance problems 0 1 Difficulty remembering 0 1 Trouble falling asleep 0 1 NA
22. Dizziness 0 1 COGNITIVE Total (0-4) SLEEP Total (0-4)

Visual problems: 0 1 EMOTIONAL (0)

23. Fatigue: __Yes__ _No__ _Unknown__ __Indeterminate__ __Not answered__

24. Illness: __Yes__ _No__ _Unknown__ __Indeterminate__ __Not answered__

25. Sensitivity to light: __Yes__ _No__ _Unknown__ __Indeterminate__ __Not answered__

26. Sensitivity to noise: __Yes__ _No__ _Unknown__ __Indeterminate__ __Not answered__

27. Numbness Tingling: __Yes__ _No__ _Unknown__ __Indeterminate__ __Not answered__

PHYSICAL Total (0-10) EMOTIONAL Total (0-1)

(ADD: Physical, Cognitive, Emotional, Sleep Indexes Total Symptom Score (0-22))

28. Headache History: __Yes__ _No__ _Unknown__ __Indeterminate__ __Not answered__
29. Nausea History: __Yes__ _No__ _Unknown__ __Indeterminate__ __Not answered__

30. Developmental History: __Yes__ _No__ _Unknown__ __Indeterminate__ __Not answered__

31. Psychiatric History: __Yes__ _No__ _Unknown__ __Indeterminate__ __Not answered__

32. Length of symptom duration: __Days__ __Weeks__ __Months__ __Years__ __Unknown__ __Indeterminate__ __Not answered__

33. If multiple concussions, time force caused relapse: __Yes__ _No__ __Unknown__ __Indeterminate__ __Not answered__

34. Other neurological/medical diagnosis: __Yes__ _No__ _Unknown__ __Indeterminate__ __Not answered__

35. Other psychiatric disorder: __Yes__ _No__ _Unknown__ __Indeterminate__ __Not answered__

B. Risk Factors for Protracted Recovery

36. Any other neurological/medical diagnosis: __Yes__ _No__ _Unknown__ __Indeterminate__ __Not answered__

C. RED FLAGS for acute emergency management

37. Headache: __Yes__ _No__ _Unknown__ __Indeterminate__ __Not answered__

38. Nausea: __Yes__ _No__ _Unknown__ __Indeterminate__ __Not answered__

39. Vomiting: __Yes__ _No__ _Unknown__ __Indeterminate__ __Not answered__

40. Balance problems: __Yes__ _No__ _Unknown__ __Indeterminate__ __Not answered__

41. Dizziness: __Yes__ _No__ _Unknown__ __Indeterminate__ __Not answered__

42. Visual problems: __Yes__ _No__ _Unknown__ __Indeterminate__ __Not answered__

43. Fatigue: __Yes__ _No__ _Unknown__ __Indeterminate__ __Not answered__

44. Illness: __Yes__ _No__ _Unknown__ __Indeterminate__ __Not answered__

D. Additional Clinical Diagnoses (if any)

E. Follow-Up Actions

F. ACE Complied by:

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The item form is part of the "Head Up" Back Injury or Your Patient's exit kit developed by the Centers for Disease Control and Prevention (CDC).
Assess

- Age-appropriate, validated postconcussive symptom-rating scales should be used as a component of diagnostic and prognostic evaluation.
- Related premorbid history should be assessed at the initial injury evaluation because recovery might be delayed in those with:
  - History of mTBI;
  - Increased postconcussive symptoms;
  - Pre-injury neurological or psychiatric disorder;
  - Learning difficulties;
  - Lower cognitive ability; or
  - Family and social stressors.
- Though no single factor is strongly predictive of outcome, screen for known risk factors of prolonged recovery (possibly using validated prediction rules) to aid in providing counseling to patients and families. Prolonged recovery is more common among:
  - Older children/adolescents
  - Hispanic ethnicity
  - Lower socioeconomic status
  - More severe presentation of mTBI, including intracranial hemorrhage
  - Higher levels of postconcussive symptoms
Treat and Educate

- Clinicians should provide guidance on the management of cognitive and physical activity/rest that will affect return to play and school, including:
  1. More restrictive physical and cognitive activity during the first few days followed by a gradual return to activity/play that does not significantly exacerbate symptoms
  2. Close monitoring of symptom number and severity
  3. Follow-up instructions as activity integration cannot be determined from an ED setting and joint medical and school-based teams should address these specifics including “clearance” for full activity
- ED clinicians should give recommendations for sleep hygiene to facilitate recovery
The 2 year old that falls from bed at 9pm

Clinical Scenario
Thank you!

• Questions?

Angela Lumba-Brown, MD
Co-Director, Stanford Concussion and Brain Performance Center
Assistant Professor of Emergency Medicine and Pediatrics, Stanford University School of Medicine