# CDC Guideline for the Diagnosis and Management of Mild Pediatric Traumatic Brain Injury

*Summary of CDC Response to Peer Reviewers*

## OVERVIEW

Two peer reviewers were invited to review the full drafts of the *CDC Guideline on the Diagnosis and Management of Mild Traumatic Brain Injury Among Children" and "Diagnosis and Management of Mild Traumatic Brain Injury Among Children: A Systematic Review*". Peer reviewers were asked to share their opinions on:

- The reasonableness of the recommendations, and the strength of the recommendations, based on evidence and expert opinion;
- The clarity with which scientific uncertainties are identified; and
- The rationale, importance, clarity, and ease of implementation of the recommendations.

To assist with their review, peer reviewers were provided with the comments receive through the public comment period (docket number CDC-2017-0089) that took place September 29th through November 28th.

CDC selects peer reviewers based on expertise and diversity of scientific viewpoints, while addressing conflict of interest concerns and ensuring independence from the guideline development process. Peer reviewers identified for this review also have:

- High scientific standing;
- Appropriate academic training and relevant experience;
- Proven scientific excellence in the diagnosis and management of mild traumatic brain injury (mTBI) among children and adolescents;
- Expertise in at least one of the following areas:
    - Pediatrics
    - Family Medicine
    - Internal Medicine
    - Emergency Medicine
    - Neurology
    - Neurosurgery
    - Neuroimaging
    - Neuropsychology

The summary below provides an overview of the more substantial changes CDC made to the guideline and systematic review in response to the feedback received through this process. The areas summarized are not inclusive of all the edits made. CDC greatly appreciates the opportunity to receive feedback through the peer review process and appreciates the time and effort the individual peer reviewers committed to their review. Based on the feedback, CDC was able to strengthen and improve the quality of the guideline and systematic review.

## RESPONSE TO GENERAL COMMENTS

- Reviewers #1 and #2 suggested that CDC review and update the references. Reviewer #1 identified incomplete references and references that are dated outside of the literature review timeframe. Reviewer #2 stated that some studies that address research gaps outlined in the systematic review and guideline were missed. This is because they were published following the literature review period. Examples include studies comparing computerized neurocognitive test modules and those that examine factors that predict recovery.
    - CDC reviewed the reference list and made edits to incomplete references.
    - Additional language was added to explain the use of "related evidence" in the guideline. Specifically, while the systematic review was limited to a specified time period (i.e., December 1, 2012 to July 31, 2015), subsequent related evidence was used by the Workgroup to provide context for guideline recommendations and inform rationales. An example of related evidence included in the guideline is the inclusion of a study published by Zemek, et al. (2016) on validated prediction rules.

- Reviewer #2 commented that the exclusion of studies that combined patients under age 18 and over age 18 is a limitation. The Reviewer explained that there may be valuable findings specific to the pediatric age group and relevant to the current systematic review and guideline that are omitted from the evidence.
    - CDC acknowledges the potential loss of important studies in the review as a result of this issue. However, for studies in which participants age 18 and under were not stratified or reported separately, it was not possible to report evidence specific to pediatric patients in that age range. However, such studies may have been included as related evidence in recommendation rationales.

RESPONSE TO COMMENTS ABOUT THE SYSTEMATIC REVIEW:

- Reviewer #1 noted that there is a heavy emphasis on findings from children and adolescents who present to emergency departments or outpatient clinics for medical attention for mTBI. The Reviewer suggests citing the lack of information available on those children who never seek medical attention to highlight this current information gap.
    - CDC edited the systematic review to make explicit that the review is in service to informing recommendations for clinicians in the acute care and outpatient settings. Specifically the bolded text was added to this sentence in the Introduction: *"This review was conducted to inform the first evidenced-based clinical guideline in the United States on the management of pediatric mTBI* ***in the acute care and outpatient settings****."*

- Review #1 recommended further clarification regarding the definitions of terms such as mTBI and concussion and how they are similar and different.
    - CDC added additional explanation in the Introduction to provide further clarification of the various terms: *" Though "concussion," "minor head injury," and mTBI are frequently used interchangeably, they have different connotations for families, researchers, and healthcare providers, allowing for misinterpretation.[i] [ii] Resultantly, the Guideline recommends the clinical use of the single term "mild traumatic brain injury". In 2004, the World Health Organization Collaborating Task Force on Mild Traumatic Brain Injury, alongside the Mild Traumatic Brain Injury Committee of the Head Injury Interdisciplinary Special Interest Group of the American Congress of Rehabilitation Medicine, and the US Centers for Disease Control and Prevention's (CDC) MTBI Working Group Report to Congress[iii] [iv] defined mTBI as "an acute brain injury resulting from mechanical energy to the head from external physical forces including: (i) 1 or more of the following: confusion or disorientation, loss of consciousness for 30 minutes or less, post-traumatic amnesia for less than 24 hours, and/or other transient neurological abnormalities such as focal signs, symptoms, or seizure; (ii) Glasgow Coma Scale score of 13–15 after 30 minutes post-injury or later upon presentation for healthcare."[v] In efforts to be cognizant of the heterogeneity of presentations and outcomes of children with mTBI and to prevent the exclusion of children representing the more severe end of the mTBI spectrum, the 2018 CDC guideline supports this wide clinical and functional definition of pediatric mTBI in children with concussive sign and symptomatology or signs following direct or in-direct head injury, presenting with a Glasgow Coma Scale (GCS) scores of 13-15, with or without the complication of intracranial injury on neuroimaging, and regardless of the potential to require a hospital admission and/or neurosurgical intervention."*

RESPONSE TO COMMENTS ABOUT THE GUIDELINE:

- Both Reviewers #1 and #2 suggested a review of existing consensus statements on sports-related concussion to identify the degree of alignment and discrepancy with the current CDC guideline.
    - CDC conducted a review of other existing documents and found consistency in other guidelines. Additionally, CDC added a reference to the Berlin Concussion in Sports guidelines, which includes a systematic review of the literature on sports-related concussion.

- Reviewer #1 recommended the inclusion of more detailed guidance on return to sport following a concussion for pediatric patients, including return to contact sport and assisting those with persistent symptoms.

- CDC acknowledges the importance of return to play guidance for pediatric patients who participate in sports and recreation activities. Recommendation set 13 provides guidance to healthcare providers regarding return to activity, including sports participation. However, given that the focus of this guideline is on all causes of mTBI, we provide references to evidence-based guidelines specific to return to play for those wanting detailed information on this more specific subset of mTBI.

- Both Reviewers #1 and #2 commented on Recommendation set 5, related to assessment tools. Reviewer #1 questioned the reference to the Post Concussion Symptom Scale and noted potential missing references from important publications on the topic of symptom-rating scales. The Reviewer states that the Health & Behavior Inventory (HBI) and the Post-concussion Symptom Inventory (PCSI) are more commonly used in pediatric mTBI and have solid psychometric properties for use with children. Reviewer #2 cited conflicting language regarding recommending the use of assessment tools for mTBI, but also indicated that no test should be used in isolation to diagnosis mTBI.
  - CDC added in references to the Health & Behavior Inventory and the Post-concussion Symptom Inventory in the rationale section of Recommendation set 5.
  - We did not make a change in reference to Reviewer #2s comment as we do not state explicitly that any test should be used in isolation.

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[i] Dematteo CA, Hanna SE, Mahoney WJ, et al. My child doesn't have a brain injury, he only has a concussion. *Pediatrics*. 2010 Feb;125(2):327-234.

[ii] Gordon KE, Dooley JM, Fitzpatrick EA, Wren P, Wood EP. Concussion or mild traumatic brain injury: parents appreciate the nuances of nosology. *Pediatr Neurol*. 2010;43(4):253-257.

[iii] The Mild Traumatic Brain Injury Committee of the Head Injury Interdisciplinary Special Interest Group of the American Congress of Rehabilitation Medicine. Definition of mild traumatic brain injury. J Head Trauma Rehabil 1993; 8: 86–87.

[iv] Centers for Disease Control and Prevention, National Center for Injury Prevention and Control. Report to Congress on Mild Traumatic Brain Injury in the United States: Steps to Prevent a Serious Public Health Problem. Atlanta, GA: Centers for Disease Control and Prevention; 2003:1-47. http://www.cdc.gov/traumaticbraininjury/pdf/mtbireport-a.pdf

[v] Carroll LJ, Cassidy JD, Holm L, Kraus J, Coronado VG. Methodological issues and research recommendations for mild traumatic brain injury: the WHO Collaborating Centre Task Force on Mild Traumatic Brain Injury. Journal of rehabilitation medicine. Feb 2004(43 Suppl):113-125.