

Supplementary Content

Lumba-Brown A, Yeates KO, Sarmiento K, Breiding MJ, Haegerich TM, Gioia GA, Turner M, Benzel EC, Suskauer SJ, Giza CC, Joseph M. Centers for Disease Control and Prevention guideline on the diagnosis and management of mild traumatic brain injury among children. *JAMA pediatrics*. 2018 Nov 1;172(11):e182853-e182853.

eAppendix. Clinical Contextual Profiles

eTable. CDC Pediatric mTBI Guideline Recommendations

eAppendix. Clinical Contextual Profiles

Assigning Strength of Recommendation

As part of the systematic review,¹ the American Academy of Neurology Classification of Evidence Scheme² was used to assign the risk of bias and assign a Class for each study (e.g., Class I (e.g., high quality RCTs), Class II (e.g., RCTs with significant limitations), Class III (e.g., other controlled studies), and Class IV (e.g., no measures of effectiveness or statistical precision). Following completion of the systematic review, workgroup members were presented with a series of potential recommendations and a rationale for each recommendation. The rationale was based on the research identified in the systematic review, as well as related evidence that pertained to the recommendation.

Workgroup members' judgments were sought regarding multiple domains pertaining to the recommendation, using a modified Delphi process. The goal was to attain consensus after a maximum of four rounds of voting. Consensus was defined by: > 80% agreement on dichotomous judgments, and 80% agreement, within one point, for ordinal judgments. If consensus was obtained the Strength of Recommendation was assigned at the median. If not, it was assigned at the 10th percentile.

The final strength of recommendation was indicated by a helping verb: "May," "Should" or "Must" corresponding to levels of recommendation of "C," "B" or "A." Workgroup members were given the discretion of using the helping verb "Should" or "Must" for recommendations that attained a strength of Level A.

Draft recommendations were worded with a default "Should" helping verb. Recommendation developers were given the option of changing this helping verb to "May" when recommendations did not attain consensus. In this situation, the finalized recommendation could not have a strength greater than "May."

Steps used to assign final Strength of Recommendation:

1. Level of Confidence in the Inference (High, Moderate, Low, Very Low) was based on an assessment of the cogency of the rationale supporting each recommendation, and assigned on the basis of five domains rated by workgroup members:
 - a. Rationale is logical
 - b. Evidence statements are accurate
 - c. Axioms are true
 - d. Related evidence is strong and applicable
 - e. Internal inferences logically follow

Workgroup members voted yes/no on each of these qualities of the rationale, for each candidate recommendation. Consensus on each domain was defined as > 80% agreement. The lowest level of agreement among Workgroup members determined the Level of Confidence in the inference.

2. Strength of Recommendation was modified on the basis of Workgroup members' assessment of each recommendation's benefit relative to harm (large, moderate, small, and similar). Consensus was defined as 80% agreement within one level. Strength of recommendation could be moved up one level based on this assessment or, if it was judged to be lower than the Level of Confidence in the Inference, could be moved down.
3. Strength of Recommendation could then be downgraded based on assessment of the Workgroup on the following domains:
 - a. Importance of the outcome: not important, mildly important, very important, critically important
 - b. Expected variation in patient preferences: minimal, modest, moderate, large
 - c. Financial burden relative to benefit expected: very large, large, moderate, small
 - d. Feasibility of intervention: rarely feasible, occasionally feasible, usually feasible, always feasible

Consensus was defined as 80% agreement within one level.

References

1. Lumba-Brown A, Yeates KO, Sarmiento K, Breiding MJ, Haegerich TM, Gioia GA, Turner M, Benzel EC, Suskauer SJ, Giza CC, Joseph M. Diagnosis and management of mild traumatic brain injury in children: a systematic review. *JAMA pediatrics*. 2018 Nov 1;172(11):e182847-e182847.
2. Gronseth GS, Woodroffe LM, Getchius TSD. *Clinical Practice Guideline Process Manual*. St. Paul, MN: American Academy of Neurology; 2011.

1a. Health care providers *should not* routinely obtain head CT for diagnostic purposes in children with mTBI. (Moderate Confidence in Inference, Level B)

Domain	Rating				Consensus
	< 50%	50% to < 80%	80% to < 100%	100%	
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 0	Benefit > Harm 2	Benefit >> Harm 4	Benefit >>> Harm 11	Yes
Importance of outcomes	Not Important 0	Mildly 0	Very Important 8	Critically Important 9	Yes
Variation in preferences	Large 1	Moderate 1	Modest 12	Minimal 3	Yes
Feasible	Rarely 0	Occasionally 0	Usually 3	Always 14	Yes
Cost relative to net benefit	Very Large 0	Large 1	Moderate 2	Small 14	Yes
Strength of recommendation	R/U	C	B	A	

1b. Health care providers *should* use validated clinical decision rules to identify children with mTBI at low risk for intracranial injury, in whom head CT is not indicated, as well as children who may be at higher risk for clinically important ICI, and therefore may warrant head CT. Existing decision rules, such as the Pediatric Emergency Care Applied Research Network (PECARN) decision rules, combine a variety of factors that, when assessed together, may increase the risk for more serious injury. Such risk factors include the following:

- Age < 2 years old
- Vomiting
- Loss of consciousness
- Severe mechanism of injury
- Severe or worsening headache
- Amnesia
- Nonfrontal scalp hematoma
- Glasgow Coma Score < 15
- Clinical suspicion for skull fracture

(Moderate Confidence in Inference, Level B)

Domain	Rating				Consensus
	< 50%	50% to < 80%	80% to < 100%	100%	
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 0	Benefit > Harm 0	Benefit >> Harm 3	Benefit >>> Harm 15	Yes
Importance of outcomes	Not Important 0	Mildly 1	Very 7	Critically Important 10	Yes
Variation in preferences	Large 0	Moderate 0	Modest 5	Minimal 13	Yes
Feasible	Rarely 0	Occasionally 0	Usually 6	Always 12	Yes
Cost relative to net benefit	Very Large 0	Large 0	Moderate 3	Small 15	Yes

Strength of recommendation	R/U	C	B	A	
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1c. For children diagnosed with mTBI, health care providers *should* discuss the risks of pediatric head CT in the context of risk factors for ICI with the patient and his/her family. **(Moderate Confidence in Inference, Level B)**

Domain	Rating				Consensus
	< 50%	50% to < 80%	80% to < 100%	100%	
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 0	Benefit > Harm 0	Benefit >> Harm 3	Benefit >>> Harm 15	Yes
Importance of outcomes	Not Important 0	Mildly 0	Very 6	Critically Important 12	Yes
Variation in preferences	Large 0	Moderate 1	Modest 7	Minimal 10	Yes
Feasible	Rarely 0	Occasionally 0	Usually 8	Always 10	Yes
Cost relative to net benefit	Very Large 0	Large 0	Moderate 7	Small 11	Yes
Strength of recommendation	R/U	C	B	A	

2. Health care providers *should not* routinely use MRI in the acute evaluation of suspected or diagnosed mTBI. (**Moderate Confidence in Inference, Level B**)

Domain	Rating				Consensus
	< 50%	50% to < 80%	80% to < 100%	100%	
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 2	Benefit > Harm 1	Benefit >> Harm 9	Benefit >>> Harm 7	Yes
Importance of outcomes	Not Important 2	Mildly 1	Very 11	Critically Important 5	Yes
Variation in preferences	Large 0	Moderate 1	Modest 7	Minimal 11	Yes
Feasible	Rarely 0	Occasionally 2	Usually 7	Always 10	Yes
Cost relative to net benefit	Very Large 2	Large 1	Moderate 4	Small 12	Yes
Strength of recommendation	R/U	C	B	A	

3. Health care providers *should not* use SPECT in the acute evaluation of cases of suspected or diagnosed mTBI. (**Moderate Confidence in Inference, Level B**)

Domain	Rating				Consensus
	< 50%	50% to < 80%	80% to < 100%	100%	
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 1	Benefit > Harm 2	Benefit >> Harm 3	Benefit >>> Harm 12	Yes
Importance of outcomes	Not Important 4	Mildly 3	Very 8	Critically Important 3	No
Variation in preferences	Large 1	Moderate 0	Modest 0	Minimal 17	Yes
Feasible	Rarely 0	Occasionally 5	Usually 2	Always 11	No
Cost relative to net benefit	Very Large 1	Large 1	Moderate 2	Small 14	Yes
Strength of recommendation	R/U	C	B	A	

4a. Skull X-rays *should not* be used in the diagnosis of pediatric mTBI. (High Confidence in Inference, Level B)

Domain	Rating				Consensus
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 0	Benefit > Harm 2	Benefit >> Harm 3	Benefit >>> Harm 13	Yes
Importance of outcomes	Not Important 0	Mildly 2	Very 9	Critically Important 7	Yes
Variation in preferences	Large 0	Moderate 0	Modest 3	Minimal 15	Yes
Feasible	Rarely 0	Occasionally 0	Usually 4	Always 14	Yes
Cost relative to net benefit	Very Large 0	Large 0	Moderate 4	Small 14	Yes
Strength of recommendation	R/U	C	B	A	

4b. Skull X-rays *should not* be used in the screening for ICI. (High Confidence in Inference, Level B)

Domain	Rating				Consensus
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 0	Benefit > Harm 0	Benefit >> Harm 5	Benefit >>> Harm 13	Yes
Importance of outcomes	Not Important 0	Mildly 1	Very 8	Critically Important 9	Yes
Variation in preferences	Large 0	Moderate 0	Modest 3	Minimal 15	Yes
Feasible	Rarely 0	Occasionally 0	Usually 3	Always 15	Yes
Cost relative to net benefit	Very Large 0	Large 1	Moderate 3	Small 14	Yes
Strength of recommendation	R/U	C	B	A	

5a. Health care providers *should* use an age-appropriate, validated symptom rating scale as a component of the diagnostic evaluation in children seen with acute mTBI. **(Moderate Confidence in Inference, Level B)**

Domain	Rating				Consensus
	< 50%	50% to < 80%	80% to < 100%	100%	
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 0	Benefit > Harm 0	Benefit >> Harm 1	Benefit >>> Harm 17	Yes
Importance of outcomes	Not Important 0	Mildly 0	Very 7	Critically Important 11	Yes
Variation in preferences	Large 0	Moderate 3	Modest 4	Minimal 11	Yes
Feasible	Rarely 0	Occasionally 0	Usually 3	Always 15	Yes
Cost relative to net benefit	Very Large 0	Large 1	Moderate 3	Small 14	Yes
Strength of recommendation	R/U	C	B	A	

5b. Health care providers *may* use validated, age-appropriate computerized cognitive testing in the acute period of injury as a component of the diagnosis of mTBI. **(Moderate Confidence in Inference, Level C)**

Domain	Rating				Consensus
	< 50%	50% to < 80%	80% to < 100%	100%	
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 1	Benefit > Harm 2	Benefit >> Harm 9	Benefit >>> Harm 6	Yes
Importance of outcomes	Not Important 0	Mildly 3	Very 12	Critically Important 3	Yes
Variation in preferences	Large 0	Moderate 5	Modest 7	Minimal 6	No
Feasible	Rarely 0	Occasionally 12	Usually 6	Always 0	Yes
Cost relative to net benefit	Very Large 0	Large 7	Moderate 8	Small 3	Yes
Strength of recommendation	R/U	C	B	A	

5c. The Standardized Assessment of Concussion (SAC) *should not* be exclusively used to diagnose mTBI in children 6-18 years.
(Moderate Confidence in Inference, Level B)

Domain	Rating				Consensus
	< 50%	50% to < 80%	80% to < 100%	100%	
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 1	Benefit > Harm 1	Benefit >> Harm 5	Benefit >>> Harm 10	Yes
Importance of outcomes	Not Important 0	Mildly 1	Very 14	Critically Important 2	Yes
Variation in preferences	Large 0	Moderate 0	Modest 4	Minimal 13	Yes
Feasible	Rarely 0	Occasionally 3	Usually 3	Always 11	Yes
Cost relative to net benefit	Very Large 0	Large 0	Moderate 3	Small 14	Yes
Strength of recommendation	R/U	C	B	A	

6. Health care providers *should not* use biomarkers outside of a research setting for the diagnosis of children with mTBI. (High Confidence in Inference, Level R)

Domain	Rating				Consensus
	< 50%	50% to < 80%	80% to < 100%	100%	
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 1	Benefit > Harm 0	Benefit >> Harm 7	Benefit >>> Harm 9	Yes
Importance of outcomes	Not Important 2	Mildly 2	Very 9	Critically Important 4	No
Variation in preferences	Large 0	Moderate 1	Modest 1	Minimal 15	Yes
Feasible	Rarely 1	Occasionally 5	Usually 0	Always 11	No
Cost relative to net benefit	Very Large 0	Large 1	Moderate 2	Small 14	Yes
Strength of recommendation	R/U	C	B	A	

Note: Strength of recommendation ultimately rated as Level R because the statement recommends against performing the tests outside of a research setting.

7a. Health care providers *should* counsel patients and families that most majority (70-80%) of children with mTBI do not show significant difficulties that last more than 1-3 months after injury. **(Moderate Confidence in Inference, Level B)**

Domain	Rating				Consensus
	< 50%	50% to < 80%	80% to < 100%	100%	
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 0	Benefit > Harm 0	Benefit >> Harm 5	Benefit >>> Harm 11	Yes
Importance of outcomes	Not Important 0	Mildly 0	Very 11	Critically Important 5	Yes
Variation in preferences	Large 0	Moderate 0	Modest 2	Minimal 14	Yes
Feasible	Rarely 0	Occasionally 0	Usually 2	Always 14	Yes
Cost relative to net benefit	Very Large 0	Large 1	Moderate 1	Small 14	Yes
Strength of recommendation	R/U	C	B	A	

7b. Health care providers *should* counsel patients and families that, although some factors predict an increased or decreased risk for prolonged symptoms, each child’s recovery from mTBI is unique and will follow its own trajectory. **(Moderate Confidence in Inference, Level B)**

Domain	Rating				Consensus
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 0	Benefit > Harm 0	Benefit >> Harm 2	Benefit >>> Harm 14	Yes
Importance of outcomes	Not Important 0	Mildly 1	Very 10	Critically Important 5	Yes
Variation in preferences	Large 0	Moderate 0	Modest 1	Minimal 15	Yes
Feasible	Rarely 0	Occasionally 1	Usually 4	Always 11	Yes
Cost relative to net benefit	Very Large 0	Large 0	Moderate 3	Small 13	Yes
Strength of recommendation	R/U	C	B	A	

8a. Health care providers *should* assess the premorbid history of children either before injury as a part of pr-participation athletic examinations or as soon as possible after injury in children with mTBI to assist in determining prognosis. **(Moderate Confidence in Inference, Level B)**

Domain	Rating				Consensus
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 0	Benefit > Harm 0	Benefit >> Harm 3	Benefit >>> Harm 13	Yes
Importance of outcomes	Not Important 0	Mildly 0	Very 11	Critically Important 5	Yes
Variation in preferences	Large 0	Moderate 1	Modest 4	Minimal 11	Yes
Feasible	Rarely 0	Occasionally 0	Usually 5	Always 11	Yes
Cost relative to net benefit	Very Large 0	Large 2	Moderate 2	Small 12	Yes
Strength of recommendation	R/U	C	B	A	

8b. Health care providers *should* counsel children and families completing preparticipation athletic examinations and children with mTBI as well as their families that recovery from mTBI might be delayed in those with the following:

- Premorbid histories of mTBI
- Lower cognitive ability (for children with an intracranial lesion)
- Neurological or psychiatric disorder
- Learning difficulties
- Increased pre-injury symptoms (i.e., similar to those commonly referred to as “postconcussive”)
- Family and social stressors (**Moderate Confidence in Inference, Level B**)

Domain	Rating				Consensus
	< 50%	50% to < 80%	80% to < 100%	100%	
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 1	Benefit > Harm 0	Benefit >> Harm 5	Benefit >>> Harm 9	Yes
Importance of outcomes	Not Important 1	Mildly 0	Very 10	Critically Important 4	Yes
Variation in preferences	Large 0	Moderate 2	Modest 2	Minimal 11	Yes
Feasible	Rarely 0	Occasionally 0	Usually 5	Always 10	Yes
Cost relative to net benefit	Very Large 0	Large 3	Moderate 1	Small 11	Yes
Strength of recommendation	R/U	C	B	A	

9a. Health care providers *should* screen for known risk factors for persistent symptoms in children with mTBI. (Moderate Confidence in Inference, Level B)

Domain	Rating				Consensus
	< 50%	50% to < 80%	80% to < 100%	100%	
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 0	Benefit > Harm 0	Benefit >> Harm 7	Benefit >>> Harm 10	Yes
Importance of outcomes	Not Important 0	Mildly 1	Very 14	Critically Important 2	Yes
Variation in preferences	Large 0	Moderate 1	Modest 2	Minimal 14	Yes
Feasible	Rarely 0	Occasionally 1	Usually 6	Always 10	Yes
Cost relative to net benefit	Very Large 0	Large 1	Moderate 6	Small 10	Yes
Strength of recommendation	R/U	C	B	A	

9b. Health care providers *may* use validated prediction rules, which combine information about multiple risk factors for persistent symptoms, to provide prognostic counseling to children with mTBI evaluated in ED settings. **(High Confidence in Inference, Level B)**

Domain	Rating				Consensus
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 1	Benefit > Harm 0	Benefit >> Harm 6	Benefit >>> Harm 9	Yes
Importance of outcomes	Not Important 1	Mildly 2	Very 11	Critically Important 2	Yes
Variation in preferences	Large 1	Moderate 1	Modest 4	Minimal 10	Yes
Feasible	Rarely 1	Occasionally 1	Usually 8	Always 6	Yes
Cost relative to net benefit	Very Large 0	Large 0	Moderate 6	Small 10	Yes
Strength of recommendation	R/U	C	B	A	

Note: Recommendations did not attain consensus at the “Should” level and so the recommendation developers exercised the option of changing to the “May” wording at which point consensus was reached.

10a. Health care providers *should* use a combination of tools to assess recovery in children with mTBI. (Moderate Confidence in Inference, Level B)

Domain	Rating				Consensus
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 0	Benefit > Harm 0	Benefit >> Harm 5	Benefit >>> Harm 11	Yes
Importance of outcomes	Not Important 0	Mildly 1	Very 12	Critically Important 3	Yes
Variation in preferences	Large 1	Moderate 0	Modest 4	Minimal 11	Yes
Feasible	Rarely 0	Occasionally 4	Usually 9	Always 3	Yes
Cost relative to net benefit	Very Large 0	Large 1	Moderate 10	Small 5	Yes
Strength of recommendation	R/U	C	B	A	

10b. Health care providers *should* use validated symptom scales to assess recovery in children with mTBI. **(Moderate Confidence in Inference, Level B)**

Domain	Rating				Consensus
	< 50%	50% to < 80%	80% to < 100%	100%	
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 0	Benefit > Harm 0	Benefit >> Harm 4	Benefit >>> Harm 13	Yes
Importance of outcomes	Not Important 0	Mildly 0	Very 12	Critically Important 5	Yes
Variation in preferences	Large 0	Moderate 0	Modest 3	Minimal 14	Yes
Feasible	Rarely 0	Occasionally 1	Usually 10	Always 6	Yes
Cost relative to net benefit	Very Large 0	Large 0	Moderate 8	Small 9	Yes
Strength of recommendation	R/U	C	B	A	

10c. Health care providers *may* use validated cognitive testing (including measures of reaction time) to assess recovery in children with mTBI. **(Moderate Confidence in Inference, Level C)**

Domain	Rating				Consensus
	< 50%	50% to < 80%	80% to < 100%	100%	
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 0	Benefit > Harm 1	Benefit >> Harm 7	Benefit >>> Harm 8	Yes
Importance of outcomes	Not Important 1	Mildly 2	Very 12	Critically Important 1	Yes
Variation in preferences	Large 1	Moderate 2	Modest 6	Minimal 7	Yes
Feasible	Rarely 0	Occasionally 8	Usually 8	Always 0	Yes
Cost relative to net benefit	Very Large 0	Large 4	Moderate 11	Small 1	Yes
Strength of recommendation	R/U	C	B	A	

10d. Health care providers *may* use balance testing to assess recovery in adolescent athletes with mTBI. **(Moderate Confidence in Inference, Level C)**

Domain	Rating				Consensus
	< 50%	50% to < 80%	80% to < 100%	100%	
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 1	Benefit > Harm 3	Benefit >> Harm 6	Benefit >>> Harm 6	No
Importance of outcomes	Not Important 2	Mildly 2	Very 11	Critically Important 1	Yes
Variation in preferences	Large 1	Moderate 1	Modest 7	Minimal 7	Yes
Feasible	Rarely 0	Occasionally 8	Usually 5	Always 3	Yes
Cost relative to net benefit	Very Large 1	Large 3	Moderate 9	Small 3	No
Strength of recommendation	R/U	C	B	A	

11a. Health care providers *should* closely monitor children with mTBI who are determined to be at high risk for persistent symptoms based on their premorbid history, demographics, and/or injury characteristics. **(High Confidence in Inference,**

Domain	Rating				Consensus
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 0	Benefit > Harm 0	Benefit >> Harm 3	Benefit >>> Harm 13	Yes
Importance of outcomes	Not Important 0	Mildly 1	Very 9	Critically Important 6	Yes
Variation in preferences	Large 0	Moderate 2	Modest 7	Minimal 7	Yes
Feasible	Rarely 0	Occasionally 0	Usually 10	Always 6	Yes
Cost relative to net benefit	Very Large 1	Large 1	Moderate 3	Small 11	Yes
Strength of recommendation	R/U	C	B	A	

11b. For children with mTBI whose symptoms do not resolve as expected with standard care (i.e., within 4-6 weeks), health care providers *should* provide or refer for appropriate assessments and/or interventions (see Recommendations for Treatment and Management). **(Moderate Confidence in Inference, Level B)**

Domain	Rating				Consensus
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 0	Benefit > Harm 0	Benefit >> Harm 4	Benefit >>> Harm 12	Yes
Importance of outcomes	Not Important 0	Mildly 1	Very 9	Critically Important 6	Yes
Variation in preferences	Large 0	Moderate 2	Modest 9	Minimal 5	Yes
Feasible	Rarely 0	Occasionally 5	Usually 10	Always 1	Yes
Cost relative to net benefit	Very Large 0	Large 2	Moderate 11	Small 3	Yes
Strength of recommendation	R/U	C	B	A	

12. In providing education and reassurance to the family, the health care provider *should* include the following information:

- Warning signs of more serious injury
- Description of injury and expected course of symptoms and recovery
- Instructions on how to monitor postconcussive symptoms
- Prevention of further injury
- Management of cognitive and physical activity/rest
- Instructions regarding return to play/recreation and school
- Clear clinician follow-up instructions. **(High Confidence in Inference, Level A)**

Domain	Rating				Consensus
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 0	Benefit > Harm 1	Benefit >> Harm 3	Benefit >>> Harm 15	Yes
Importance of outcomes	Not Important 0	Mildly 0	Very 7	Critically Important 12	Yes
Variation in preferences	Large 0	Moderate 0	Modest 4	Minimal 15	Yes
Feasible	Rarely 0	Occasionally 0	Usually 8	Always 11	Yes
Cost relative to net benefit	Very Large 0	Large 0	Moderate 6	Small 13	Yes
Strength of recommendation	R/U	C	B	A	

13a. Health care providers *should* counsel patients to observe more restrictive physical and cognitive activity during the first several days following mTBI in children. **(Moderate Confidence in Inference, Level B)**

Domain	Rating				Consensus
	< 50%	50% to < 80%	80% to < 100%	100%	
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 1	Benefit > Harm 2	Benefit >> Harm 3	Benefit >>> Harm 12	Yes
Importance of outcomes	Not Important 0	Mildly 0	Very 10	Critically Important 8	Yes
Variation in preferences	Large 0	Moderate 2	Modest 10	Minimal 6	Yes
Feasible	Rarely 1	Occasionally 0	Usually 5	Always 12	Yes
Cost relative to net benefit	Very Large 0	Large 0	Moderate 6	Small 12	Yes
Strength of recommendation	R/U	C	B	A	

13b. Following these first several days, health care providers *should* counsel patients and families to resume a gradual schedule of activity that does not exacerbate symptoms, with close monitoring of symptom expression (number, severity). **(Moderate Confidence in Inference, Level B)**

Domain	Rating				Consensus
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 1	Benefit > Harm 1	Benefit >> Harm 5	Benefit >>> Harm 11	Yes
Importance of outcomes	Not Important 0	Mildly 0	Very 16	Critically Important 2	Yes
Variation in preferences	Large 0	Moderate 1	Modest 10	Minimal 7	Yes
Feasible	Rarely 0	Occasionally 0	Usually 5	Always 13	Yes
Cost relative to net benefit	Very Large 0	Large 0	Moderate 7	Small 11	Yes
Strength of recommendation	R/U	C	B	A	

13c. Following the successful resumption of a gradual schedule of activity (see 13b), health care providers *should* offer an active rehabilitation program of progressive reintroduction of noncontact aerobic activity that does not exacerbate symptoms, with close monitoring of symptom expression (number, severity). **(High Confidence in Inference, Level B)**

Domain	Rating				Consensus
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 0	Benefit > Harm 0	Benefit >> Harm 3	Benefit >>> Harm 13	Yes
Importance of outcomes	Not Important 0	Mildly 0	Very 11	Critically Important 5	Yes
Variation in preferences	Large 0	Moderate 1	Modest 9	Minimal 6	Yes
Feasible	Rarely 0	Occasionally 0	Usually 11	Always 5	Yes
Cost relative to net benefit	Very Large 0	Large 0	Moderate 7	Small 9	Yes
Strength of recommendation	R/U	C	B	A	

13d. Health care providers *should* counsel patients to return to full activity when they return to pre-morbid performance if they have remained symptom free at rest and with increasing levels of physical exertion. **(Moderate Confidence in Inference, Level B)**

Domain	Rating				Consensus
	< 50%	50% to < 80%	80% to < 100%	100%	
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 0	Benefit > Harm 0	Benefit >> Harm 5	Benefit >>> Harm 11	Yes
Importance of outcomes	Not Important 0	Mildly 0	Very 10	Critically Important 6	Yes
Variation in preferences	Large 0	Moderate 0	Modest 4	Minimal 12	Yes
Feasible	Rarely 0	Occasionally 0	Usually 7	Always 9	Yes
Cost relative to net benefit	Very Large 0	Large 3	Moderate 5	Small 8	Yes
Strength of recommendation	R/U	C	B	A	

14. Health care providers *may* assess the extent and types of social support (i.e., emotional, informational, instrumental, appraisal) in children with mTBI and emphasize social support as a key element in the education of caregivers and educators. **(Moderate Confidence in Inference, Level B)**

Domain	Rating				Consensus
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 0	Benefit > Harm 0	Benefit >> Harm 9	Benefit >>> Harm 9	Yes
Importance of outcomes	Not Important 1	Mildly 6	Very 9	Critically Important 2	Yes
Variation in preferences	Large 1	Moderate 2	Modest 8	Minimal 7	Yes
Feasible	Rarely 0	Occasionally 3	Usually 8	Always 7	Yes
Cost relative to net benefit	Very Large 0	Large 0	Moderate 11	Small 7	Yes
Strength of recommendation	R/U	C	B	A	

Note: Recommendations did not attain consensus at the “Should” level and so the recommendation developers exercised the option of changing to the “May” wording at which point consensus was reached.

15a. To assist children returning to school following mTBI, medical and school-based teams *should* counsel the student and family regarding the process of gradually increasing the duration and intensity of academic activities as tolerated, with the goal of increasing participation without significantly exacerbating symptoms. **(Moderate Confidence in Inference, Level B)**

Domain	Rating				Consensus
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 1	Benefit > Harm 1	Benefit >> Harm 1	Benefit >>> Harm 13	Yes
Importance of outcomes	Not Important 0	Mildly 0	Very 6	Critically Important 10	Yes
Variation in preferences	Large 0	Moderate 1	Modest 5	Minimal 10	Yes
Feasible	Rarely 0	Occasionally 0	Usually 7	Always 9	Yes
Cost relative to net benefit	Very Large 0	Large 3	Moderate 4	Small 9	Yes
Strength of recommendation	R/U	C	B	A	

15b. Return to school protocols *should* be customized based on the severity of postconcussion symptoms in children with mTBI as determined jointly by medical and school-based teams. **(Moderate Confidence in Inference, Level B)**

Domain	Rating				Consensus
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 0	Benefit > Harm 0	Benefit >> Harm 3	Benefit >>> Harm 12	Yes
Importance of outcomes	Not Important 0	Mildly 0	Very 4	Critically Important 11	Yes
Variation in preferences	Large 0	Moderate 2	Modest 6	Minimal 7	Yes
Feasible	Rarely 0	Occasionally 0	Usually 7	Always 8	Yes
Cost relative to net benefit	Very Large 0	Large 2	Moderate 4	Small	Yes
Strength of recommendation	R/U	C	B	A	

15c. For any student with prolonged symptoms that interfere with academic performance, school-based teams *should* assess the educational needs of that student and determine the student’s need for additional educational supports, including those described under pertinent federal statutes (e.g., Section 504, IDEA). **(High Confidence in Inference, Level B)**

Domain	Rating				Consensus
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 0	Benefit > Harm 0	Benefit >> Harm 6	Benefit >>> Harm 10	Yes
Importance of outcomes	Not Important 0	Mildly 0	Very 11	Critically Important 5	Yes
Variation in preferences	Large 0	Moderate 4	Modest 7	Minimal 5	No
Feasible	Rarely 0	Occasionally 2	Usually 13	Always 1	Yes
Cost relative to net benefit	Very Large 0	Large 0	Moderate 16	Small 0	Yes
Strength of recommendation	R/U	C	B	A	

15d. Postconcussion symptoms and academic progress in school *should* be monitored collaboratively by the student, family, health care provider, and school teams, who jointly determine what modifications or accommodations are needed to maintain an academic workload without significantly exacerbating symptoms. **(High Confidence in Inference, Level B)**

Domain	Rating				Consensus
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 0	Benefit > Harm 0	Benefit >> Harm 7	Benefit >>> Harm 11	Yes
Importance of outcomes	Not Important 0	Mildly 0	Very 11	Critically Important 7	Yes
Variation in preferences	Large 1	Moderate 3	Modest 8	Minimal 6	No
Feasible	Rarely 0	Occasionally 4	Usually 11	Always 3	Yes
Cost relative to net benefit	Very Large 0	Large 0	Moderate 17	Small 1	Yes
Strength of recommendation	R/U	C	B	A	

15e. The provision of educational supports *should* be monitored and adjusted on an ongoing basis by the school-based team until the student’s academic performance has returned to preinjury levels. **(Moderate Confidence in Inference, Level B)**

Domain	Rating				Consensus
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 0	Benefit > Harm 0	Benefit >> Harm 3	Benefit >>> Harm 7	Yes
Importance of outcomes	Not Important 0	Mildly 0	Very 6	Critically Important 4	Yes
Variation in preferences	Large 0	Moderate 2	Modest 5	Minimal 3	Yes
Feasible	Rarely 0	Occasionally 0	Usually 9	Always 1	Yes
Cost relative to net benefit	Very Large 0	Large 2	Moderate 5	Small 3	Yes
Strength of recommendation	R/U	C	B	A	

15f. For students who demonstrate prolonged symptoms and academic difficulties despite an active treatment approach, health care providers *should* refer the child for a formal evaluation by a specialist in pediatric mTBI. **(Moderate Confidence in Inference, Level B)**

Domain	Rating				Consensus
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 0	Benefit > Harm 1	Benefit >> Harm 4	Benefit >>> Harm 13	Yes
Importance of outcomes	Not Important 0	Mildly 1	Very 8	Critically Important 9	Yes
Variation in preferences	Large 2	Moderate 3	Modest 9	Minimal 4	No
Feasible	Rarely 0	Occasionally 7	Usually 11	Always 0	Yes
Cost relative to net benefit	Very Large 0	Large 1	Moderate 17	Small 0	Yes
Strength of recommendation	R/U	C	B	A	

16a. Health care providers in the ED *should* clinically observe and consider obtaining a head CT in children presenting with severe and worsening headache following mTBI to evaluate for ICI requiring further management in accord with validated clinical decision making rules. **(High Confidence in Inference, Level B)**

Domain	Rating				Consensus
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 0	Benefit > Harm 0	Benefit >> Harm 5	Benefit >>> Harm 11	Yes
Importance of outcomes	Not Important 0	Mildly 0	Very 5	Critically Important 11	Yes
Variation in preferences	Large 0	Moderate 0	Modest 5	Minimal 11	Yes
Feasible	Rarely 0	Occasionally 0	Usually 6	Always 10	Yes
Cost relative to net benefit	Very Large 0	Large 0	Moderate 12	Small	Yes
Strength of recommendation	R/U	C	B	A	

16b. Children undergoing observation periods for headache with acutely worsening symptoms *should* undergo emergent neuroimaging. **(High Confidence in Inference, Level B)**

Domain	Rating				Consensus
	< 50%	50% to < 80%	80% to < 100%	100%	
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 0	Benefit > Harm 0	Benefit >> Harm 9	Benefit >>> Harm 10	Yes
Importance of outcomes	Not Important 0	Mildly 1	Very 3	Critically Important 15	Yes
Variation in preferences	Large 0	Moderate 1	Modest 3	Minimal 15	Yes
Feasible	Rarely 0	Occasionally 1	Usually 11	Always 7	Yes
Cost relative to net benefit	Very Large 0	Large 0	Moderate 16	Small 3	Yes
Strength of recommendation	R/U	C	B	A	

16c. Health care providers and caregivers *should* offer non-opioid analgesia (i.e., ibuprofen or acetaminophen) to children with painful headache following acute mTBI, but also provide counseling to the family regarding the risks of analgesic overuse, including rebound headache. **(Moderate Confidence in Inference, Level B)**

Domain	Rating				Consensus
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 0	Benefit > Harm 2	Benefit >> Harm 5	Benefit >>> Harm 9	Yes
Importance of outcomes	Not Important 0	Mildly 1	Very 13	Critically Important 2	Yes
Variation in preferences	Large 0	Moderate 0	Modest 6	Minimal 10	Yes
Feasible	Rarely 0	Occasionally 0	Usually 8	Always 8	Yes
Cost relative to net benefit	Very Large 0	Large 0	Moderate 8	Small 8	Yes
Strength of recommendation	R/U	C	B	A	

16d. Health care providers *should not* administer 3% hypertonic saline to children with mTBI for treatment of acute headache outside of a research setting at this time. **(Moderate Confidence in Inference, Level R)**

Domain	Rating				Consensus
	< 50%	50% to < 80%	80% to < 100%	100%	
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 1	Benefit > Harm 2	Benefit >> Harm 8	Benefit >>> Harm 6	Yes
Importance of outcomes	Not Important 1	Mildly 5	Very 9	Critically Important 2	Yes
Variation in preferences	Large 0	Moderate 2	Modest 1	Minimal 14	Yes
Feasible	Rarely 0	Occasionally 1	Usually 4	Always 12	Yes
Cost relative to net benefit	Very Large 0	Large 0	Moderate 6	Small 11	Yes
Strength of recommendation	R/U	C	B	A	

Note: Strength of recommendation ultimately rated as Level R because the statement recommends against performing the tests outside of a research setting.

16e. Chronic headache following mTBI is likely to be multifactorial; therefore, health care providers *should* refer children with chronic headache after mTBI for multidisciplinary evaluation and treatment, with consideration of analgesic overuse as a contributory factor. **(High Confidence in Inference, Level B)**

Domain	Rating				Consensus
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 0	Benefit > Harm 0	Benefit >> Harm 6	Benefit >>> Harm 11	Yes
Importance of outcomes	Not Important 0	Mildly 0	Very 16	Critically Important 1	Yes
Variation in preferences	Large 0	Moderate 2	Modest 10	Minimal 5	Yes
Feasible	Rarely 0	Occasionally 7	Usually 8	Always 2	Yes
Cost relative to net benefit	Very Large 0	Large 2	Moderate 14	Small 1	Yes
Strength of recommendation	R/U	C	B	A	

17. Health care providers *may* refer children with subjective or objective evidence of persistent vestibulo-ocular motor dysfunction following mTBI to a program of vestibular rehabilitation. **(Moderate Confidence in Inference, Level C)**

Domain	Rating				Consensus
	< 50%	50% to < 80%	80% to < 100%	100%	
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 1	Benefit > Harm 0	Benefit >> Harm 10	Benefit >>> Harm 6	Yes
Importance of outcomes	Not Important 2	Mildly 2	Very 12	Critically Important 1	Yes
Variation in preferences	Large 1	Moderate 4	Modest 7	Minimal 5	No
Feasible	Rarely 1	Occasionally 12	Usually 4	Always 0	Yes
Cost relative to net benefit	Very Large 0	Large 4	Moderate 13	Small 0	Yes
Strength of recommendation	R/U	C	B	A	

18a. Health care providers *should* provide guidance on proper sleep hygiene methods to facilitate recovery from pediatric mTBI.
(Moderate Confidence in Inference, Level B)

Domain	Rating				Consensus
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 0	Benefit > Harm 0	Benefit >> Harm 1	Benefit >>> Harm 16	Yes
Importance of outcomes	Not Important 0	Mildly 0	Very 14	Critically Important 3	Yes
Variation in preferences	Large 0	Moderate 0	Modest 7	Minimal 10	Yes
Feasible	Rarely 0	Occasionally 0	Usually 6	Always 11	Yes
Cost relative to net benefit	Very Large 0	Large 0	Moderate 2	Small 15	Yes
Strength of recommendation	R/U	C	B	A	

18b. If sleep problems emerge or continue despite appropriate sleep hygiene measures, health care providers *may* refer children with mTBI to a sleep disorder specialist for further assessment. **(Moderate Confidence in Inference, Level C)**

Domain	Rating				Consensus
	< 50%	50% to < 80%	80% to < 100%	100%	
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 0	Benefit > Harm 1	Benefit >> Harm 8	Benefit >>> Harm 8	Yes
Importance of outcomes	Not Important 0	Mildly 2	Very 14	Critically Important 1	Yes
Variation in preferences	Large 1	Moderate 4	Modest 7	Minimal 5	No
Feasible	Rarely 0	Occasionally 10	Usually 7	Always 0	Yes
Cost relative to net benefit	Very Large 0	Large 2	Moderate 15	Small 0	Yes
Strength of recommendation	R/U	C	B	A	

19a. Health care providers *should* attempt to determine the etiology of cognitive dysfunction, within the context of other mTBI symptoms. **(Moderate Confidence in Inference, Level B)**

Domain	Rating				Consensus
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 0	Benefit > Harm 1	Benefit >> Harm 4	Benefit >>> Harm 11	Yes
Importance of outcomes	Not Important 0	Mildly 1	Very 10	Critically Important 5	Yes
Variation in preferences	Large 1	Moderate 2	Modest 5	Minimal 8	Yes
Feasible	Rarely 1	Occasionally 3	Usually 9	Always 3	No
Cost relative to net benefit	Very Large 0	Large 3	Moderate 8	Small 5	Yes
Strength of recommendation	R/U	C	B	A	

19b. Health care providers *should* recommend treatment for cognitive dysfunction that reflects its presumed etiology. (High Confidence in Inference, Level B)

Domain	Rating				Consensus
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 0	Benefit > Harm 0	Benefit >> Harm 4	Benefit >>> Harm 13	Yes
Importance of outcomes	Not Important 0	Mildly 0	Very 13	Critically Important 4	Yes
Variation in preferences	Large 0	Moderate 3	Modest 11	Minimal 3	Yes
Feasible	Rarely 0	Occasionally 4	Usually 12	Always 1	Yes
Cost relative to net benefit	Very Large 0	Large 0	Moderate 14	Small 3	Yes
Strength of recommendation	R/U	C	B	A	

19c. Health care providers *may* refer children with persisting problems related to cognitive function for a formal neuropsychological evaluation to assist in determining etiology and recommending targeted treatment. **(High Confidence in Inference, Level B)**

Domain	Rating				Consensus
Rationale is logical	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Evidence statements accurate	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Axioms true	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Related evidence strong & applicable	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Internal inferences logically follow	< 50%	50% to < 80%	80% to < 100%	100%	Yes
Confidence in Inference	Very low	Low	Moderate	High	
Benefit relative to Harm	Harm ≥ Benefit 0	Benefit > Harm 1	Benefit >> Harm 6	Benefit >>> Harm 10	Yes
Importance of outcomes	Not Important 0	Mildly 0	Very 11	Critically Important 6	Yes
Variation in preferences	Large 0	Moderate 4	Modest 10	Minimal 3	Yes
Feasible	Rarely 0	Occasionally 7	Usually 10	Always 0	Yes
Cost relative to net benefit	Very Large 0	Large 1	Moderate 16	Small 0	Yes
Strength of recommendation	R/U	C	B	A	

Note: Recommendations did not attain consensus at the “Should” level and so the recommendation developers exercised the option of changing to the “May” wording at which point consensus was reached.

eTable. CDC Pediatric mTBI Guideline Recommendations

DIAGNOSTIC RECOMMENDATIONS	
<i>Risk factors for Intracranial Injury and Computed Tomography (CT), Recommendation #1</i>	
1a.	Health care providers <i>should not</i> routinely obtain head CT for diagnostic purposes in children with mTBI.
1b.	Health care providers <i>should</i> use validated clinical decision rules to identify children with mTBI at low risk for intracranial injury (ICI), in whom head CT is not indicated, as well as children who may be at higher risk for clinically important ICI, and therefore may warrant head CT. Existing decision rules, such as the Pediatric Emergency Care Applied Research Network (PECARN) decision rules, combine a variety of factors that, when assessed together, may increase the risk for more serious injury. Such risk factors include the following: <ul style="list-style-type: none"> <li style="display: inline-block; width: 45%;">• Age < 2 years old <li style="display: inline-block; width: 45%;">• Amnesia <li style="display: inline-block; width: 45%;">• Vomiting <li style="display: inline-block; width: 45%;">• Non-frontal scalp hematoma <li style="display: inline-block; width: 45%;">• Loss of consciousness <li style="display: inline-block; width: 45%;">• Glasgow Coma Score < 15 <li style="display: inline-block; width: 45%;">• Severe mechanism of injury <li style="display: inline-block; width: 45%;">• Clinical suspicion for skull fracture. <li style="display: inline-block; width: 45%;">• Severe or worsening headache
1c.	For children diagnosed with mTBI, health care providers <i>should</i> discuss the risks of pediatric head CT in the context of risk factors for ICI with the patient and his/her family.
<i>Brain Magnetic Resonance Imaging (MRI), Recommendation #2</i>	
2.	Health care providers <i>should not</i> routinely use MRI in the acute evaluation of suspected or diagnosed mTBI.
<i>Single Photon Emission Computed Tomography (SPECT), Recommendation #3</i>	
3.	Health care providers <i>should not</i> use SPECT in the acute evaluation of suspected or diagnosed mTBI.
<i>Skull X-ray, Recommendation #4</i>	
4a.	Skull X-rays <i>should not</i> be used in the diagnosis of pediatric mTBI.
4b.	Skull X-rays <i>should not</i> be used in the screening for ICI.
<i>Neuropsychological Tools, Including Symptom Scales, Computerized Cognitive Testing, and Standardized Assessment of Concussion, Recommendation #5</i>	
5a.	Health care providers <i>should</i> use an age-appropriate, validated, symptom rating scale as a component of the diagnostic evaluation in children seen with acute mTBI.
5b.	Health care providers <i>may</i> use validated, age-appropriate computerized cognitive testing in the acute period of injury as a component of the diagnosis of mTBI.
5c.	The Standardized Assessment of Concussion (SAC) <i>should not</i> be exclusively used to diagnose mTBI in children 6-18 years .
<i>Serum Markers, Recommendation #6</i>	
6.	Health care providers <i>should not</i> use biomarkers outside of a research setting for the diagnosis of children with mTBI.
PROGNOSTIC RECOMMENDATIONS	
<i>General Health care Provider Counseling of Prognosis, Recommendation #7</i>	
7a.	Health care providers should counsel patients and families that most (70-80%) of children with mTBI do not show significant difficulties that last more than 1-3 months after injury.
7b.	Health care providers should counsel patients and families that, although some factors predict an increased or decreased risk for prolonged symptoms, each child's recovery from mTBI is unique and will follow its own trajectory.
<i>Prognosis Related to Premorbid Conditions, Recommendation #8</i>	

8a.	Health care providers should assess the premorbid history of children either before injury as a part of preparticipation athletic examinations or as soon as possible after injury in children with mTBI to assist in determining prognosis.
8b.	Health care providers should counsel children and families completing preparticipation athletic examinations and children with mTBI, as well as their families, that recovery from mTBI might be delayed in those with the following: <ul style="list-style-type: none"> • Premorbid histories of mTBI • Lower cognitive ability (for children with an intracranial lesion) • Neurological or psychiatric disorder • Learning difficulties • Increased pre-injury symptoms (i.e., similar to those commonly referred to as “post-concussive”) • Family and social stressors.
Assessment of Cumulative Risk Factors and Prognosis, Recommendation #9	
9a.	Health care providers should screen for known risk factors for persistent symptoms in children with mTBI.
9b.	Health care providers may use validated prediction rules, which combine information about multiple risk factors for persistent symptoms, to provide prognostic counseling to children with mTBI evaluated in ED settings.
Assessment Tools and Prognosis, Recommendation #10	
10a.	Health care providers should use a combination of tools to assess recovery in children with mTBI.
10b.	Health care providers should use validated symptom scales to assess recovery in children with mTBI.
10c.	Health care providers may use validated cognitive testing (including measures of reaction time) to assess recovery in children with mTBI.
10d.	Health care providers may use balance testing to assess recovery in adolescent athletes with mTBI.
Interventions for mTBI with Poor Prognosis, Recommendation #11	
11a.	Health care providers should closely monitor children with mTBI who are determined to be at high risk for persistent symptoms based on their premorbid history, demographics, and/or injury characteristics.
11b.	For children with mTBI whose symptoms do not resolve as expected with standard care (i.e., within 4-6 weeks), health care providers should provide or refer for appropriate assessments and/or interventions.
RECOMMENDATIONS RELATED TO MANAGEMENT AND TREATMENT	
Patient/Family Education and Reassurance, Recommendation #12	
12.	In providing education and reassurance to the family, the health care provider should include the following information: <ul style="list-style-type: none"> • Warning signs of more serious injury • Description of injury and expected course of symptoms and recovery • Instructions on how to monitor post-concussive symptoms • Prevention of further injury • Management of cognitive and physical activity/rest • Instructions regarding return to play/recreation and school • Clear clinician follow-up instructions.
Cognitive/Physical Rest and Aerobic Treatment, Recommendation #13	

13a.	Health care providers should counsel patients to observe more restrictive physical and cognitive activity during the first several days following mTBI in children.
13b.	Following these first several days, health care providers should counsel patients and families to resume a gradual schedule of activity that does not exacerbate symptoms, with close monitoring of symptom expression (number, severity).
13c.	Following the successful resumption of a gradual schedule of activity (see 13b), health care providers should offer an active rehabilitation program of progressive re-introduction of non-contact aerobic activity that does not exacerbate symptoms, with close monitoring of symptom expression (number, severity).
13d.	Health care providers should counsel patients to return to full activity when they return to premorbid performance if they have remained symptom-free at rest and with increasing levels of physical exertion.
<i>Psychosocial/Emotional Support, Recommendation #14</i>	
14.	Health care providers may assess the extent and types of social support (i.e., emotional, informational, instrumental, appraisal) available to children with mTBI and emphasize social support as a key element in the education of caregivers and educators.
<i>Return to School, Recommendation #15</i>	
15a.	To assist children returning to school following mTBI, medical and school-based teams should counsel the student and family regarding the process of gradually increasing the duration and intensity of academic activities as tolerated, with the goal of increasing participation without significantly exacerbating symptoms.
15b.	Return-to-school protocols should be customized based on the severity of postconcussion symptoms in children with mTBI as determined jointly by medical and school-based teams.
15c.	For any student with prolonged symptoms that interfere with academic performance, school-based teams should assess the educational needs of that student and determine the student's need for additional educational supports, including those described under pertinent federal statutes (e.g., Section 504, IDEA).
15d.	Postconcussion symptoms and academic progress in school should be monitored collaboratively by the student, family, health care provider(s), and school teams, who jointly determine what modifications or accommodations are needed to maintain an academic workload without significantly exacerbating symptoms.
15e.	The provision of educational supports should be monitored and adjusted on an ongoing basis by the school-based team until the student's academic performance has returned to preinjury levels.
15f.	For students who demonstrate prolonged symptoms and academic difficulties despite an active treatment approach, health care providers should refer the child for a formal evaluation by a specialist in pediatric mTBI.
<i>Posttraumatic Headache Management/Treatment, Recommendation #16</i>	
16a.	Health care providers in the ED should clinically observe and consider obtaining a head CT in children presenting with severe headache, especially when associated with other risk factors and worsening headache following mTBI, to evaluate for ICI requiring further management in accord with validated clinical decision-making rules.
16b.	Children undergoing observation periods for headache with acutely worsening symptoms should undergo emergent neuroimaging.
16c.	Health care providers and caregivers should offer non-opioid analgesia (i.e., ibuprofen or acetaminophen) to children with painful headache following acute mTBI but also provide counseling to the family regarding the risks of analgesic overuse, including rebound headache.
16d.	Health care providers should not administer 3% hypertonic saline to children with mTBI for treatment of acute headache outside of a research setting at this time.
16e.	Chronic headache following mTBI is likely to be multifactorial; therefore, health care providers should refer children with chronic headache after mTBI for multidisciplinary evaluation and treatment, with consideration of analgesic overuse as a contributory factor.
<i>Vestibulo-Oculomotor Dysfunction Management/Treatment, Recommendation #17</i>	

17.	Health care providers <i>may</i> refer children with subjective or objective evidence of persistent vestibulo-oculomotor dysfunction following mTBI to a program of vestibular rehabilitation.
Sleep Management/Treatment, Recommendation #18	
18a.	Health care providers <i>should</i> provide guidance on proper sleep hygiene methods to facilitate recovery from pediatric mTBI.
18b.	If sleep problems emerge or continue despite appropriate sleep hygiene measures, health care providers <i>may</i> refer children with mTBI to a sleep disorder specialist for further assessment.
Cognitive Impairment Management/Treatment, Recommendation #19	
19a.	Health care providers <i>should</i> attempt to determine the etiology of cognitive dysfunction within the context of other mTBI symptoms.
19b.	Health care providers <i>should</i> recommend treatment for cognitive dysfunction that reflects its presumed etiology.
19c.	Health care providers <i>may</i> refer children with persisting problems related to cognitive function for a formal neuropsychological evaluation to assist in determining etiology and recommending targeted treatment.