

## ASSESSMENT OF

## Minor Head Trauma in Pediatric Patients

This care process model (CPM) was developed by the Pediatric Emergency Medicine Collaborative, a subgroup of the Intensive Medicine and Pediatric Specialty Clinical Programs at Intermountain Healthcare. Recommendations are based on available scientific evidence and regional standards of care. These recommendations are applicable to patients younger than 18 years with acute, isolated, minor head trauma without complicating features.

### ► Why Focus ON MINOR HEAD TRAUMA IN CHILDREN?

- **It's common.** Head trauma is a common reason children present for medical care.
- **Presentation can be misleading.** While most instances of pediatric head trauma are minor, some children presenting with apparent minor head trauma have clinically important traumatic brain injury (ciTBI; see *definition at right*).
- **Accurate assessment is complex.** Assessment requires consideration of many factors, as no single factor accurately identifies patients at very low risk of ciTBI.
- **CT use is variable and often overutilized.** Implementing a guideline is likely to reduce unnecessary CT scans and attendant risk of CT-induced malignancy.

### WHAT IS A "CLINICALLY IMPORTANT TRAUMATIC BRAIN INJURY" (ciTBI)?

**Clinically important traumatic brain injury (ciTBI) denotes traumatic brain injury resulting in an adverse outcome or requiring significant intervention.**

One important study defined ciTBI as "death, need for neurosurgery, intubation for more than 24 hours, or hospital admission of 2 nights or more associated with traumatic brain injury as shown by CT."<sup>1</sup>

### REFERENCES

An important resource for the development of this CPM is shown below. For a full list of references, go to [www.intermountainphysician.org/clinicalprograms](http://www.intermountainphysician.org/clinicalprograms) and navigate to the "Head Trauma" clinical topic via the "Clinical Topics A-Z" list on the right side of the screen.

1. Kuppermann N, Holmes JF, Dayan PS, et al; Pediatric Emergency Care Applied Research Network (PECARN). Identification of children at very low risk of clinically-important brain injuries after head trauma: a prospective cohort study. *Lancet*. 2009;374(9696):1160-1170.

### Key Points about the model and its value in clinical practice

- **An evidence-based, practical, and conservative approach to assessment.**
  - This CPM is based on a robust, landmark trial<sup>1</sup> which identified patients at very low risk of ciTBI; the model also incorporates findings from other important studies.<sup>2-10</sup>
  - This model risk-stratifies patients into groups and provides recommendations on management.
  - To help manage the complexity of evaluating very young children, the algorithm provides special clinical caveats for younger children.
- **Guidance for appropriate decisions regarding neuroimaging.**
  - CT is highly accurate in identifying intracranial injuries.
  - The use of CT is highly variable and generally increasing. It is important to avoid unnecessary CT scans given the increased risk of malignancy associated with ionizing radiation from CT scans. Lethal malignancy rates associated with pediatric head CT are estimated at 1/1000 to 1/5000, with increasing risk associated with younger age.<sup>11,12</sup>
- **Help in identifying patients appropriate for observation.**
  - By providing recommendations to help providers identify appropriate patients for observation, the model increases comfort with observation in lieu of immediate imaging. The model also provides recommendations regarding duration of observation and discharge criteria.



### Goals & Measurements

The goals of this CPM are to help clinicians reliably **identify patients with ciTBI**, while **avoiding unnecessary CT scans, given risk of CT-induced malignancy, in patients at very low risk of ciTBI**. We expect that implementing this model across the Intermountain system will result in decreased CT rates — without an increase in missed clinically important injuries.

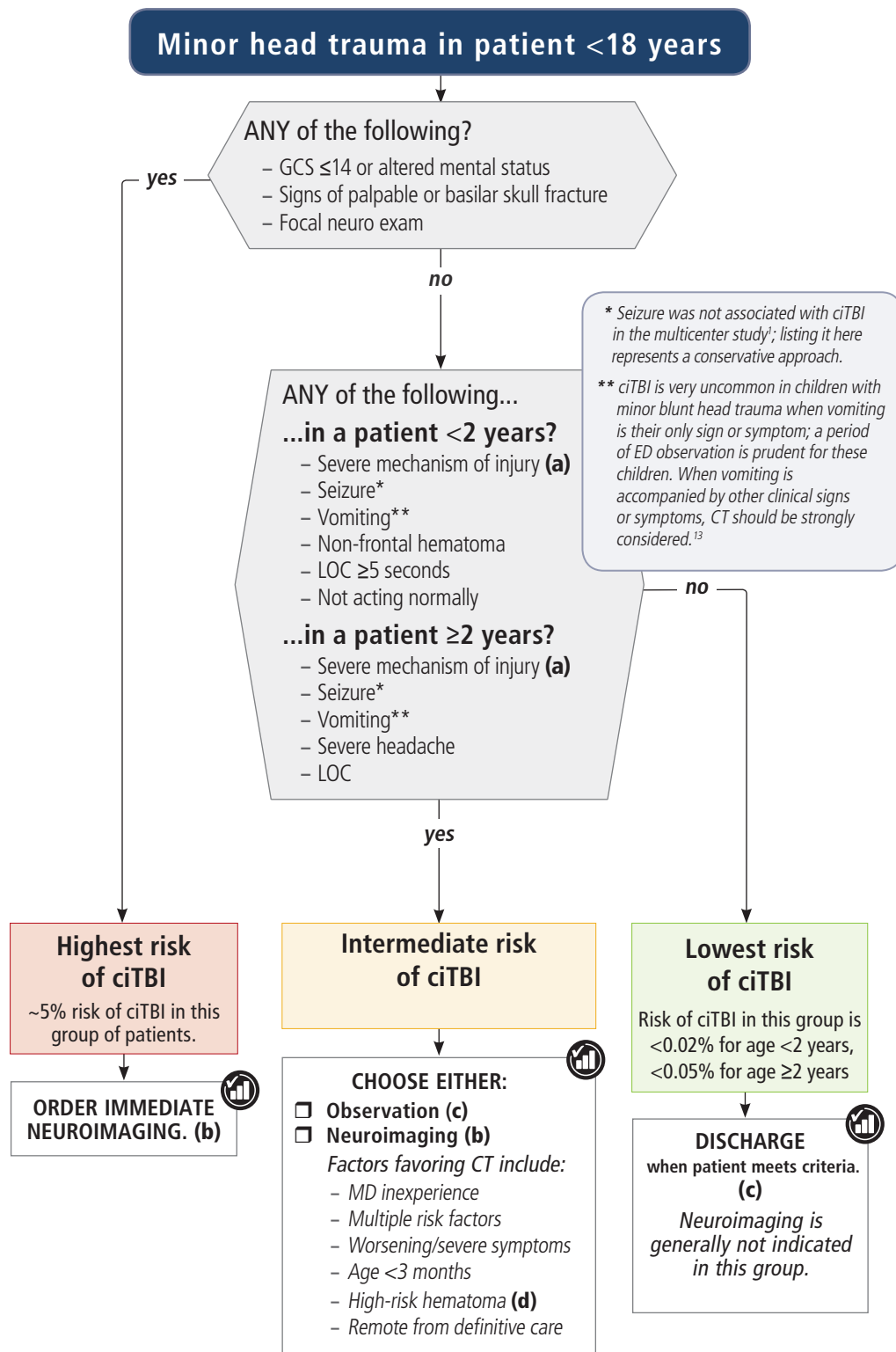
For continuous improvement, we will monitor and report facility-specific and system-wide data:

- CT rate in children presenting to the ED with minor head trauma.
- 48-hour admission rate in children with minor head trauma initially discharged from the ED.

# ▶ ALGORITHM: ASSESSMENT OF MINOR HEAD TRAUMA IN PEDIATRIC PATIENTS

**Recommended approach to acute, isolated, minor pediatric head trauma without complicating factors.**

Not intended for use in moderate or severe traumatic brain injury, GCS <14, suspected abuse, delayed presentation, multisystem trauma, penetrating injury, structural brain disease, VP shunts, bleeding disorder, or other conditions complicating assessment.



## ALGORITHM NOTES

### (a) Severe mechanism of injury

- MVC with patient ejection, death of another passenger, or rollover
- Pedestrian/bicyclist without helmet, struck by motor vehicle
- Fall >3 feet (for age <2 yrs) or >5 feet
- Head struck by high-impact object

### (b) Neuroimaging

- CT (without contrast) generally initial test of choice

### (c) Observation, discharge

- For patients with intermediate risk factors (yellow zone at left) selected for observation, observe for 3 to 4 hours from the time of injury.
- Consider discharge if patient meets criteria: normal mental status, resolving or minor symptoms, tolerating oral intake, dependable social support.
- Reconsider need for CT if symptoms worsen or are persistent and significant.

### (d) High-risk hematoma<sup>5</sup>

- Large (>3 cm) size
- Boggy (soft) consistency
- Patient age <1 year



We will monitor and report this facility-specific and system-wide data:

- CT rate in children presenting to the ED with minor head trauma
- 48-hour admission rate in children with minor head trauma initially discharged from the ED

### Education resources for patients and families:

To support shared decision-making and education on this topic, access Intermountain fact sheets by going to [www.intermountainphysician.org/clinicalprograms](http://www.intermountainphysician.org/clinicalprograms) and navigating to the "Head Trauma" clinical topic via the "Clinical Topics A-Z" list on the right side of the screen.

