MILD TRAUMATIC BRAIN INJURY TRANSFER GUIDELINE

This guideline is intended to assist hospitals with the safe disposition of their patients with isolated mild traumatic brain injury [mild TBI] who show non-significant findings on their imaging with the goal of allowing the patients to safely stay in their community and be cared for by their local resources.

Hospital emergency departments regularly care for patients with suspected brain injuries who demonstrate little or no disturbances in mental status. These patients present with a GCS of 14 or 15 and often have had a transient loss of consciousness. In the course of their screening, evidence of a traumatic brain injury may be visible on imaging. These injuries can be classified into significant and non-significant CT findings. Those with significant findings must be transferred to a Trauma Center, whereas those with non-significant findings may remain at their local hospital with close observation in many cases. These minor injuries rarely result in a neurosurgical emergency.

While most mild TBIs are safely evaluated and independently managed by community hospital Emergency Medicine providers, unexpected findings (especially in imaging) may cause predictable concern. Recognizing that the safety and proper management of these patients is ultimately the responsibility of the local Emergency Medicine provider, local provider discretion will be respected. Trauma surgeons will support local decision-making by reviewing the case with the provider(s), recommending management (which may include local admission with repeat imaging) and follow-up by primary care providers and/or rehabilitation therapies (e.g. Speech Therapists for cognitive screening). The Trauma Centers will accept these patients in transfer if appropriate strategies cannot be executed locally.

Patients with mild TBI can be managed at their local hospital after consultation with the Trauma Center. The following procedure aims to facilitate this.

(continued on next page)

PROCEDURE

Requests for urgent transfer of injured patients will be managed whenever possible between the accepting Transfer Center and the provider caring for that patient.

1. Major or multisystem injuries will be referred to the on-call Trauma Attending.

2. In cases of isolated mild TBI, head CT will be recommended, if not already done, and images will be reviewed and discussed by the local Emergency Medicine provider and the consulting Trauma Attending.
    a. Patients with one or more clinical risk factors, or significant CT findings unexpected in the context of mild TBI, as noted in Table 1, will be accepted in transfer and neurosurgery involvement will be facilitated.

3. Patients with mild TBI that can be managed at their local hospital after consultation with Trauma Center are those with absence of significant CT findings and absence of the clinical risk factors as noted in Table 1.

4. For minor or equivocal findings, the local provider and Trauma Attending will discuss an appropriate strategy for further evaluation, monitoring, and follow-up.

5. The Trauma Attending will be available, whenever possible, to directly answer questions or concerns voiced by the local provider.

6. It will be clearly articulated that in the event of any unexpected change in the patient's condition, the patient will be accepted in transfer after discussion with the Trauma Attending provided there is neurosurgical capability. The Trauma Attending will advise in the acute management of the patient. In the rare circumstance that the Trauma Center cannot accept the patient, the Trauma Center will help facilitate finding an alternative destination.

7. The case will be communicated to the Trauma Attending on the following shift, and the provider caring or the patient in the community hospital will follow-up by telephone with the Trauma Attending within 24 hours.

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Table 1: Summary Table of Recommendations*

Do Not Recommend Transfer	Recommend Transfer/Neurosurgical Consult

• **Isolated non-depressed calvarial skull fractures** (whether open or closed)
  ○ Those involving the posterior table of the frontal sinus or base of the skull may be significant and should be discussed with the trauma center
• **Isolated pneumocephalus**
  ○ Does not require admission.
  ○ Requires no specific treatment.
  ○ Antibiotics are not indicated
• **Cerebral contusion**
  ○ **Solitary contusion** measuring **less** than10 mm in diameter, or **multiple contusions** measuring **less** than 5mm in diameter
  ○ Admit for medical observation
  ○ Repeat CT in approximately 8 hours, or earlier if neurologic deterioration
• **Subarachnoid hemorrhage (SAH)**
  ○ Measuring **less** than 5 mm in thickness
  ○ Admit for medical observation
  ○ No specific treatment required
  ○ Repeat CT scan for any significant findings
• **Isolated subdural hemorrhage (SDH)**
  ○ Measuring **less** than 5 mm in thickness
  ○ Admit for medical observation
  ○ Repeat CT in 8 hours, or earlier if there is neurologic deterioration
	• **Any penetrating head injury**
	• **Severe Blunt Head Injury (GCS less than or equal to 8)** regardless of clinical risk factors or CT findings
	• **Moderate (GCS 9-13) or Mild (GCS 14-15)** Blunt Head Injury only if clinical risk factors or significant CT findings are present:
	
	<u>Clinical Risk Factors:</u>
	
	• **Antiplatelet or anticoagulant medication**
	• **CSF Leak**
	  ○ Bleeding from ear should not be confused with CSF
	• **Focal Neurologic Deficit**
	  ○ Abnormal pupil asymmetry
	  ○ New disconjugate gaze
	  ○ Objective hemiparesis
	
	<u>Significant CT Findings</u>
	
	• Depressed calvarial skull fracture **greater** than 1 cm
	• Basilar skull fracture
	• Midline shift **greater** than or **equal** to 4mm
	• Cerebral contusions
	  ○ Solitary **greater** than or **equal** to 10 mm
	  ○ Multiple **greater** than or **equal** to 5mm
	• Subarachnoid hemorrhage **greater** than or **equal** to 5mm
	• Acute subdural hemorrhage
	  ○ SDH **greater** than 5 mm in thickness
	  ○ **Less** than 5 mm in patients taking anti-platelet or anticoagulation medications
	• Epidural hemorrhage
	  ○ EDH in the posterior cranial fossa or temporal region are at higher risk for causing brainstem compression

*adapted from "Guidelines for the Triage and Transfer of patients with Brain Injury in Hawaii: Adult and Pediatric"

REFERENCES (not complete list)

- ACS-COT. ACS TQIP: Best practices in the management of traumatic brain injury. January 2015
- Carlson AP, Ramirez P et al. Low rate of delayed deterioration requiring surgical treatment in patents transferred to a tertiary care center for mild traumatic brain injury. Neurosurg Focus. Nov 2010; 29(5):E3.
- Guidelines for the Triage and Transfer of patients with Brain Injury in Hawaii: Adult and Pediatric. Department of Health EMS IPSB Trauma Program, 2013.Joseph, et al. Mild traumatic brain injury defined by Glasgow Coma Scale: Is it really mild? Brain Inj. 2015; 29(1): 11-16.
- Sweeney, et al. Prediction of neurosurgical intervention after mild traumatic brain injury using the National Trauma Data Bank. World J Emerg Surg. 2015; 10:23.
- Washington & Grubb. Are routine repeat imaging and intensive care unit admission necessary in mild traumatic brain injury? J Neurosurg. 2012; 116:549-557.
- Yun BJ, White BA et al. Opportunity to reduce transfer of patients with mild traumatic brain injury and intracranial hemorrhage to a Level 1 trauma center. Am J Emerg Med, 2017; 35:1281-1284.