



Isolated Traumatic Brain Injury Management and ICU utilization

Definitions:

Blunt mechanism only

Mild TBI is characterized as a traumatically induced physiologic disruption that is characterized by brief (<30min LOC), amnesia to events immediately before or after trauma, confusion, disorientation around the time of trauma and GCS of 13-15 after 30 minutes from event.

Mild TBI Patient with Normal Head CT
Reference EAST Mild TBI guidelines

Mild TBI patient with Abnormal Head CT
Defined as findings of intracranial hemorrhage (ICH) or skull fracture on head CT

Moderate TBI is characterized more prolonged neurologic disruption, GCS is 9-12.

Severe TBI is characterized by GCS 8 or less after traumatic injury event.

Goal of Protocol:

1. Define patients with mild TBI that require ICU management
2. Define ICU management of mild TBI

Management of Patients with Traumatic Intracranial Hemorrhage (SDH, EDH, IPH, SAH, IVH) or Skull fracture of head CT

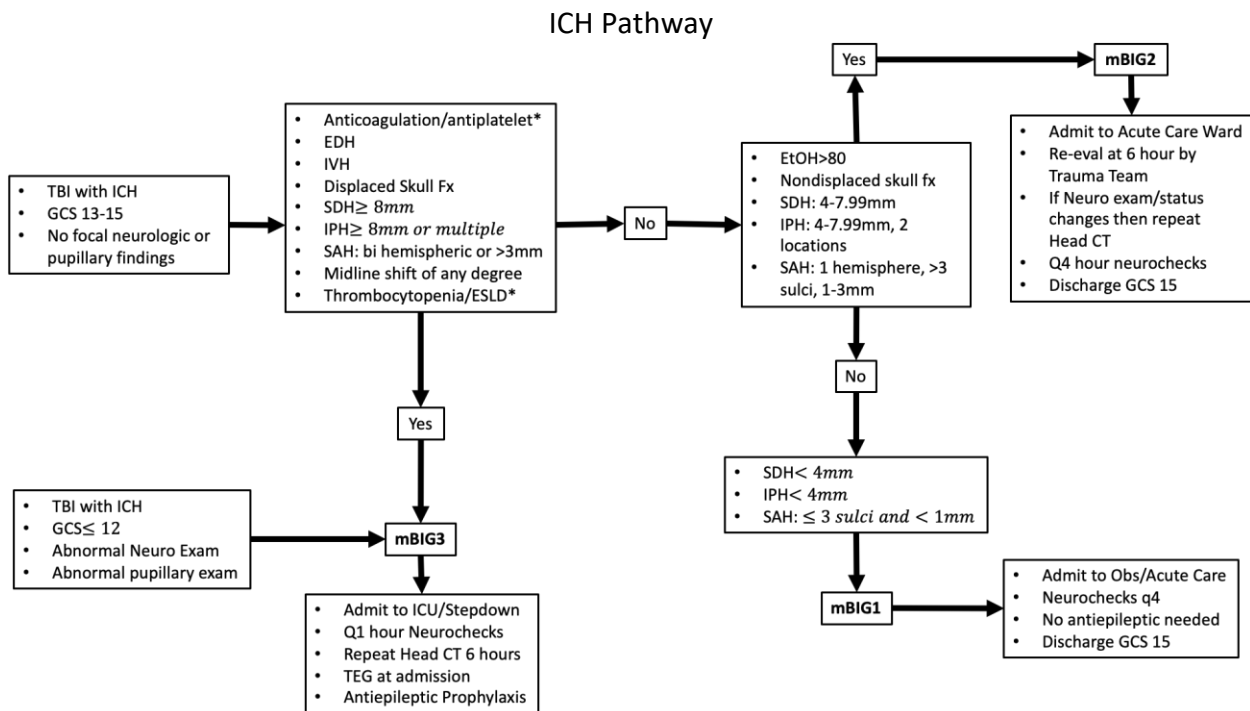
-These patients will all require a neurosurgical consultation

-Patients will then be stratified by characteristics of their exam, intoxication, antiplatelet/anticoagulation, characteristics of the bleed and skull fracture.

Definitions:

1. Abnormal Neurologic Exam is defined as focal neurologic exam (weakness, sensory loss), abnormal pupillary exam, GCS 12 or less
2. Intoxication is defined as alcohol level that is >80
3. Anticoagulants/Antiplatelets is defined as taking Antiplatelet agents(excluding ASA), Coumadin, Novel Oral Anticoagulants
4. If multiple types of bleeds then classify as mBIG3

5. Thrombocytopenia (platelets<50) and End-Stage Liver Disease (elevate INR)



* If a patient has $GCS \leq 12$, abnormal neuro exam or pupillary exam they are **Automatically mBIG3**

* If multiple types of bleeds (ICH, SAH, etc.) then classify as **mBIG3**

* If a patient has one factor in the box then it follows the “yes” pathway

*All Patients with ICH require Neurosurgery Consult

*Anticoagulation defined as therapeutic on Coumadin ($INR > 2$), taking a Novel Oral Anticoagulant (NOAC) or Antiplatelet agents (excluding ASA).

*Thrombocytopenia as platelet < 50

* If the trauma attending/neurosurgery attending feel that a deviation to the protocol is needed then documentation in the medical record is required

-Classifications of Injury

DRH Modified BIG Guidelines			
Variables	mBIG1	mBIG2	mBIG3
GCS	14-15	13	12 or less
Focal Neurologic Exam	Normal	Normal	Abnormal
Pupillary Exam	Normal	Normal	Abnormal
Antiplatelets/Anticoagulants	No	No	Yes
Thrombocytopenia/ESLD	No	No	Yes
Intoxication	No	No/Yes	No/Yes
SDH	< 4mm	4-7mm	≥ 8mm
EDH	No	No	Any
IPH	<4mm, 1 location	4-7mm, 2 locations	≥ 8mm, multiple locations
SAH	≤ 3 sulci and <1mm	1 hemisphere, >3 sulci, 1-3mm	Bi-hemispheric or >3mm
IVH	No	No	Yes
Skull Fracture	No	Non-displaced	Displaced
Midline Shift	No	No	Yes
Therapeutic Plan			
Hospitalization	Observation/Acute Care	Acute Care Floor	ICU
Frequency of Neurochecks	Q4 hour	Q4 hour	Q1 Hour
Repeat Head CT at 6 hour	No	No	Yes
Anticipated LOS	1 day	24-48 hours	>2 days
Discharge GCS	15	15	variable
Anti-epileptic Drug Propy	No	No	Yes

References:

Khan AD, Elseth AJ, Brosius JA, Moskowitz E, Liebscher SC, Anstadt MJ, Dunn JA, McVicker JH, Schroepel T, Gonzalez RP. Multicenter assessment of the Brain Injury Guidelines and a proposal of guideline modifications. *Trauma Surg Acute Care Open*. 2020 May 28;5(1):e000483. doi: 10.1136/tsaco-2020-000483. PMID: 32537518; PMCID: PMC7264829.

Ross M, Pang PS, Raslan AM, Selden NR, Cetas JS. External retrospective validation of Brain Injury Guidelines criteria and modified guidelines for improved care value in the management of patients with low-risk neurotrauma. *J Neurosurg*. 2019 Nov 8;1-6. doi: 10.3171/2019.6.JNS19584. Epub ahead of print. PMID: 31703198.

Joseph B, Friese RS, Sadoun M, Aziz H, Kulvatunyou N, Pandit V, Wynne J, Tang A, O'Keeffe T, Rhee P. The BIG (brain injury guidelines) project: defining the management of traumatic brain injury by acute care surgeons. *J Trauma Acute Care Surg.* 2014 Apr;76(4):965-9. doi: 10.1097/TA.000000000000161. PMID: 24662858.