

**Oregon Health
Authority
State Trauma
Advisory Board Brain
Injury Guidelines
(BIG) 2024**

Objectives



Discuss the new proposed OHA management guidelines of patients with mild acute traumatic brain injury (TBI)



Introduce the Brain Injury Guideline (BIG) classification of patients with acute traumatic brain injuries



Understand the criteria for BIG 1 classification



Discuss the Rational for the proposed changes for care of TBI patients

Traumatic Brain Injury

- Defined as an acute alteration in brain function caused by an external force causing injury/pathology to the brain¹
- 2.5 million people sustain a TBI each year → ~75% are mild TBI's¹
- Management of TBI's accounts for up to 10% of total health care costs in the US^{2,3}
- Interhospital transfers result in high costs to patients

Current Management of TBIs

- Patients with an intracranial hemorrhage (ICH) on CT scan, regardless of size get:
 - Neurosurgical consult
 - Transfer to a hospital with neurosurgical capabilities if not available at presenting institution
 - Admitted to hospital, often to the ICU
 - Repeat head CT

****With modern CT imaging, more minor ICH are being found → identifying more TBIs → increased costs**³**

Brain Injury Guidelines

- Guidelines developed in 2014 by Joseph et al. at the University of Arizona that help to risk stratify patients with radiographic positive TBI into 3 separate categories → BIG 1, BIG 2, BIG 3
- Provides management recommendations on whether hospitalization, repeat imaging, and/or neurosurgical consultation are required
- Takes into consideration:
 - Patient's history
 - Neurological exam
 - Findings of initial head CT scan

BIG Classification

Variable	BIG 1	BIG 2	BIG 3
LOC (loss of consciousness)	Yes/No	Yes/No	Yes/No
Neurological Exam **	Normal	Normal	Abnormal
Intoxication	No	No/Yes	No/Yes
Anti-coagulation/Anti-Platelet use, Coagulopathy	No	No	Yes
Skull Fractures	No	Non-displaced	Displaced
Subdural Hematoma	≤ 4 mm	4-7 mm	≥ 8 mm
Epidural Hematoma	≤ 4 mm	4-7 mm	≥ 8 mm
Intraparenchymal Hemorrhage	≤ 4 mm 1 location	5-7 mm 2 locations	≥ 8 mm Multiple Locations
Subarachnoid Hemorrhage	Trace (≤ 3 sulci)	Localized (1 hemisphere)	Multiple locations
Intraventricular hemorrhage	No	No	Yes

** Normal Neuro exam is no lateralizing deficits, normal pupillary exam and GCS of ≥ 12

TABLE 3. RHCT Findings

	BIG 1 (n = 121)	BIG 2 (n = 313)	BIG 3 (n = 798)
Progression on RHCT with neurologic deterioration, %	Nil	Nil	4.2
Progression on RHCT, %	Nil	2.6	21.6
New management per RHCT, %			
Craniectomy	Nil	Nil	1.6
EVD	Nil	Nil	1.4

BIG Classification Treatment Plans

Therapeutic Plan	BIG 1	BIG 2	BIG 3
Hospitalization	No – Observation for 6 hrs	Yes	Yes
Repeat Head CT (RHCT)	No	No	Yes
Neurosurgical Consult	No	No	Yes

**Any BIG patient with change in neurological exam should have a STAT RHCT and consideration for transfer and/or neurosurgical consultation

Joseph et. al. Journal of Trauma and Acute Care Surgery 76(4):p 965-969, April 2014. ³

BIG Validation Study 2022

- Multi-center, prospective validation study of the BIG guidelines
- 2,033 patients from 10 different Level 1 and 2 trauma centers
- Findings:
 - BIG 1 patients did not have neurological deterioration or need for neurosurgical intervention
 - Only 4 BIG 1 patients (1.3%) had progression on repeat head CT → this was not clinically significant for any patient

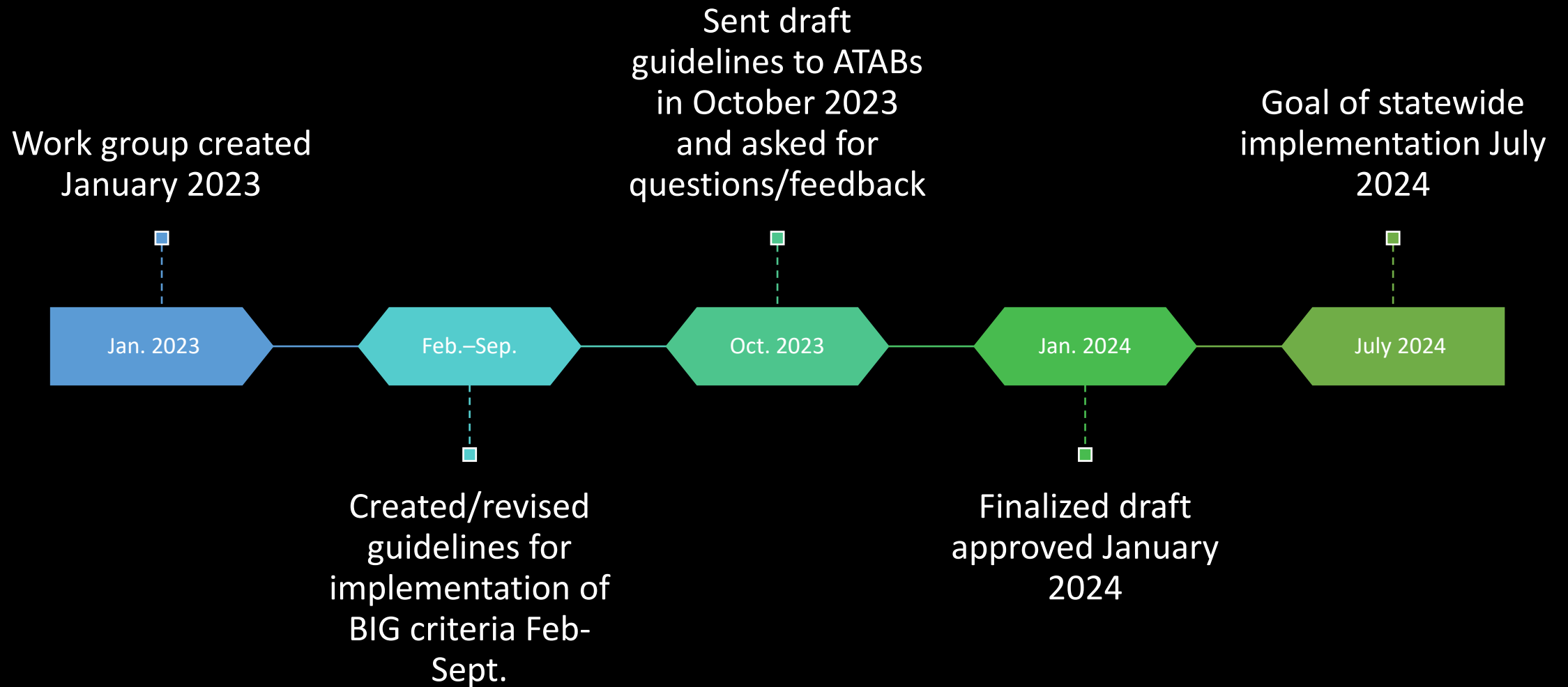
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Joseph et. al. Journal of Trauma and Acute Care Surgery. 2022;93(2):157-165⁴

Oregon State Trauma Advisory Board



Goal of the OHA/STAB BIG 1 Guidelines

Patients with acute intracranial hemorrhage that meets BIG 1 criteria to remain in home institutions for their care

- Patients do not need to transfer to a hospital with neurosurgical capabilities
- Patients do not require repeat imaging
 - Individual hospitals may choose to repeat imaging based on local resources
- Patients could be safely discharged home with outpatient follow up after 6 hours of observation
 - Individual hospitals may choose to augment this 6 hr observation period with additional observation based on local resources
- Patients should be referred to rehab services for post-TBI recovery (e.g. PT, OT, Speech therapy, cognitive rehab)

Other Considerations



If unclear which BIG category is most appropriate, consultation with a receiving trauma center is advised



If a patient has other injuries or extenuating social or medical issues not covered in the BIG guidelines, it is still reasonable to consider transfer on an individualized basis



Any patient with a BIG 2 or 3 injury should be transferred to a trauma center with neurosurgical expertise



Benefits of OHA/STAB BIG 1 Guidelines

Patients remain in home communities with their families and local resources

Avoids unnecessary transfers and the hazards inherent in transfer

Decreases unnecessary utilization of health care resources

Decreases financial burdens to patients

Final Thoughts

It is important to emphasize that this is a *guideline* and there is a wide range of individual patient variability that may not be completely covered in this guideline. In these circumstances, a discussion with the receiving trauma center is encouraged and care should be individualized to the patient.

References

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