

OREGON GUIDANCE FOR MANAGEMENT OF ADULT PATIENTS WITH MINOR BRAIN INJURIES *IN SITU*

**** April 2025 Clarification ****

This guidance document is intended only for patients ages 16 and up. Physicians treating pediatric TBI patients under 16 years of age should consult with Level I pediatric facilities for assistance on management and potential transfer.

Background

Traumatic brain injuries (TBIs) are associated with a high rate of morbidity and mortality and place a significant demand on the Oregon trauma system. TBI management accounts for up to 10% of total healthcare costs in the United States, and interhospital transfers often result in high costs to patients.^{1,2} The Brain Injury Guidelines (BIG) have emerged as a means to appropriately stratify risk for adult patients over 16 years of age with TBI and identify those at very low risk of progressive neurological deterioration.³ Managing patients according to the BIG criteria has been demonstrated to be safe and, for minimally injured patients (BIG category 1), does not require direct evaluation by neurological surgeons.⁴⁻⁷ These guidelines outline a safe approach to managing patients with mild TBIs at their hospital of presentation (*in situ*) and aim to reduce the perceived imperative to transfer these patients to hospitals with neurosurgical capabilities.

Rationale

1. BIG is designed to provide a mechanism for safe and cost-effective care. Published literature demonstrates — and many Oregon trauma centers' experiences reinforce — that patients with TBIs correctly stratified to BIG1 rarely require neurosurgical intervention or more than a short period of clinical observation.
2. Given the significant logistical, interpersonal and financial costs associated with trauma transfers, this guidance outlines which patients may be safely observed at their presenting hospital and not necessarily transferred to a large trauma hospital.
3. BIG is designed to augment the current care for patients that require trauma activation. Other injuries should be addressed using current standards of practice. Additional injuries may warrant transfer independent of the TBI severity, and established transfer practices and guidelines would continue to apply in these cases.
4. It is important to emphasize that this is a *guideline* and there is a wide range of patient variability that may not be completely covered here. In these circumstances, discussion with a trauma center with complex critical care capabilities is encouraged and care should be individualized to the patient.

Guidelines

1. Risk Stratification:

The criteria for BIG classification are detailed in “Validating the Brain Injury Guidelines” (Joseph et al., 2022)³ and are reproduced here. Patients evaluated in the Oregon trauma system should be assigned a BIG classification based on their imaging findings and clinical presentation.

Brain Injury Guidelines (BIG)			
Variables	BIG 1	BIG 2	BIG 3
Loss of Consciousness (LOC)	Yes/No	Yes/No	Yes/No
Neurologic Examinations	Normal	Normal	Abnormal
Intoxication (Impairment)	No	No/Yes	No/Yes
Anticoagulant or Antiplatelet Use	No	No	Yes
Skull Fractures	No	Non-displaced	Displaced
Subdural Hematoma	≤ 4 mm	5-7 mm	≥ 8 mm
Epidural Hematoma	≤ 4 mm	5-7 mm	≥ 8 mm
Intraparenchymal Hemorrhage	≤ 4 mm 1 Location	5-7 mm 2 Locations	≥ 8 mm Multiple Locations
Subarachnoid Hemorrhage	Trace	Localized	Multiple Locations
Intraventricular Hemorrhage	No	No	Yes
Therapeutic Plan			
Hospitalization	No, 6 hrs. Observation	Yes	Yes
Repeat Head CT (RHCT)	No	No	Yes
Neurosurgical Consult	No	No	Yes

2. Management of patients with BIG 1 injuries:

Patients with a TBI stratified to BIG 1 do not necessarily require transfer to a trauma center with complex critical care and neurosurgical expertise. The risk of injury progression in this group of patients is exceptionally low and must be balanced against the health, financial, and social risks inherent to interhospital transfers.

- As detailed above, a patient with a BIG 1 injury does *not* require repeat head CT and does *not* require neurosurgical consultation. Published data support that such patients can be safely discharged from the hospital after 6 hours of observation.
- Individual hospitals may augment this 6-hour observation period with additional observation or repeat imaging based on local resources.
- If it is unclear which BIG category is most appropriate for a patient, consultation with a trauma center with neurosurgical capabilities 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. This should be approached in consultation with a receiving trauma center on an individualized basis.
- If a patient with a BIG 1 TBI is deemed safe for discharge, referral to rehabilitation services for post-TBI recovery is recommended (e.g., physical therapy, occupational therapy, speech therapy, cognitive rehabilitation).

3. Management of patients with BIG 2 and BIG 3 injuries:

- TBIs in BIG categories 2 and 3 are potentially complex injuries and warrant transfer to a trauma center with complex critical care and neurological surgery expertise.
- Any anticoagulant use or preexisting coagulopathy warrants consideration for transfer to a trauma center with complex critical care and neurosurgery expertise *as well as* correction of the coagulopathy before transfer.

References

1. Hoyt DB, Holcomb J, Abraham E, Atkins J, Sopko G, Working Group on Trauma R. Working Group on Trauma Research Program summary report: National Heart Lung Blood Institute (NHLBI), National Institute of General Medical Sciences (NIGMS), and National Institute of Neurological Disorders and Stroke (NINDS) of the National Institutes of Health (NIH), and the Department of Defense (DOD). *J Trauma*. Aug 2004;57(2):410-5. doi:10.1097/00005373-200408000-00038
2. Follette C, Halimeh B, Chaparro A, Shi A, Winfield R. Futile trauma transfers: An infrequent but costly component of regionalized trauma care. *J Trauma Acute Care Surg*. Jul 1 2021;91(1):72-76. doi:10.1097/TA.00000000000003139
3. Joseph B, Obaid O, Dultz L, et al. Validating the Brain Injury Guidelines: Results of an American Association for the Surgery of Trauma prospective multi-institutional trial. *J Trauma Acute Care Surg*. Aug 1 2022;93(2):157-165. doi:10.1097/TA.00000000000003554
4. Joseph B, Aziz H, Pandit V, et al. Prospective validation of the brain injury guidelines: managing traumatic brain injury without neurosurgical consultation. *J Trauma Acute Care Surg*. Dec 2014;77(6):984-8. doi:10.1097/TA.0000000000000428
5. Joseph B, Aziz H, Sadoun M, et al. The acute care surgery model: managing traumatic brain injury without an inpatient neurosurgical consultation. *J Trauma Acute Care Surg*. Jul 2013;75(1):102-5; discussion 105. doi:10.1097/TA.0b013e3182946667
6. Joseph B, Friese RS, Sadoun M, et al. The BIG (brain injury guidelines) project: defining the management of traumatic brain injury by acute care surgeons. *J Trauma Acute Care Surg*. Apr 2014;76(4):965-9. doi:10.1097/TA.0000000000000161
7. Joseph B, Haider AA, Pandit V, et al. Changing paradigms in the management of 2184 patients with traumatic brain injury. *Ann Surg*. Sep 2015;262(3):440-8; discussion 446-8. doi:10.1097/SLA.00000000000001418