

MOUNT SINAI MEDICAL SYSTEM
Emergency Department System Wide Guidelines

GUIDELINES FOR NEUROIMAGING IN MINOR HEAD TRAUMA

Original date of issue _____

Reviewed:							
Revised:							

FIGURE 1.

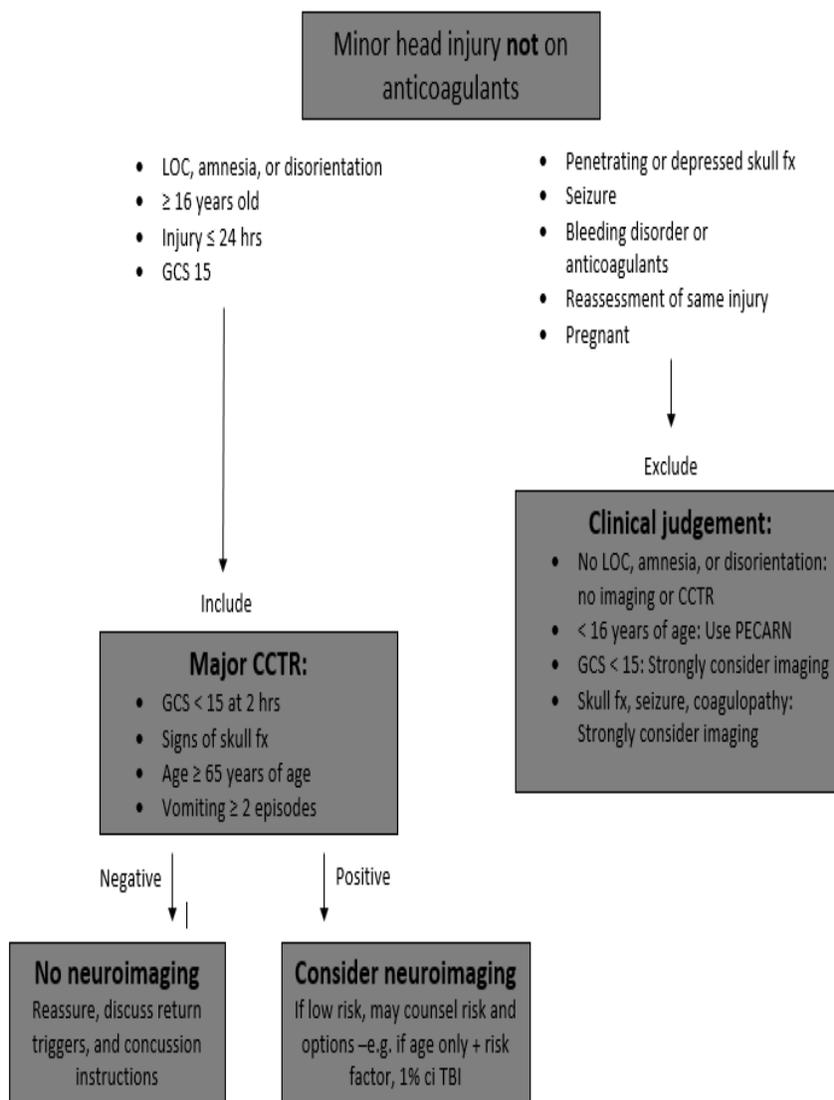
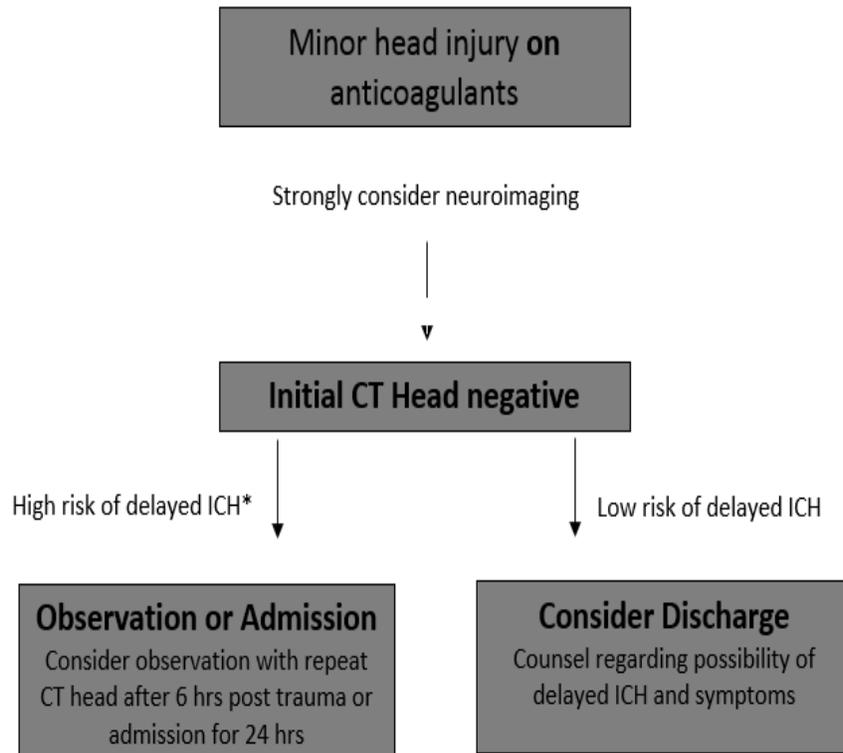


FIGURE 2.



*High risk of delayed ICH includes: INR >3.0 or poor social support for monitoring of symptoms

PURPOSE:

These guidelines are designed to support a consistent and thorough process for assessing the risk for clinically important intracranial hemorrhage (ICH) after minor head trauma and subsequent monitoring and treatment. 'Clinically important' in this setting is modeled on the Canadian CT head studies, in which this terminology described any patient that would normally require admission to the hospital and neurosurgical follow-up. This guideline should be considered relevant to non-pediatric (≥ 16 years) patients presenting within 24 hours after non-penetrating head injury, normal mental status, no focal deficits on neurologic examination, and for whom the treating clinician judges the injury to be minor. Patients with memory deficits, loss of consciousness, or other concussive symptoms should be considered relevant.

Clinical impression, clinical decision rules, and Computed Tomography of the Head (CT Head) can be effective tools to evaluate for immediate, dangerous ICH secondary to head trauma. However, a small subset of patients on anticoagulation medication can experience delayed bleeding, some even 24 hours or more after injury, and this guideline is intended to address management of these patients as well. The objective of these guidelines is to support health-care staff in effectively and consistently evaluating and treating minor head trauma patients.

GUIDELINES:

Clinician judgment may supersede any clinical decision protocol. However, Clinical Decision Rules should be utilized to reduce the need for imaging in certain low-risk populations. For example, the Canadian CT Head Rule's Major Criteria were 100% sensitive in their initial study and in both validation studies in ruling out patients who required neurosurgical intervention, and subsequently can reduce the need for imaging by up to 70%.

Due to the increased risk of intracranial hemorrhage, clinicians should have a low threshold for imaging patients on anticoagulants presenting with head injury.

Those on anticoagulants (but not those on anti-platelets) have a small chance at having a delayed bleed even after an initial negative head CT. For these patients, at a minimum, the clinicians should have a discussion with the patient and/or family regarding the possibility of delayed intracranial bleeding. However, based on clinical judgment of risk the patient may be discharged with close follow up or observed in the emergency department for a period such as up to 6 hours post injury with reassessments. Alternatively for those at high risk and poor social supports the clinician may consider admitting the patient to an observation unit or neurosurgical/trauma service. Strong consideration should be given to immediate reversal of anticoagulation among patients found to have a hemorrhagic traumatic head injury.

These guidelines also apply to any admitted patient sustaining head trauma while in the hospital.

PROCEDURE:

For any head trauma patient, the provider should first use clinical judgment to assess the risk of intracranial hemorrhage and the need for imaging or observation. Clinical decision rules for head imaging should be considered in the context of a patient's medical condition.

For patients not on blood thinners the major Canadian CT criteria as above should be utilized. When patients are determined to be negative by these criteria (only possible at 2 hours or more after injury) they should be counseled on delayed hemorrhage risk, concussion, and post-concussive concerns, and discharged with follow-up as appropriate. Patients initially assessed and noted to have a GCS<15 at any point prior to 2 hours from the injury should have neuroimaging according to clinician judgment. If the clinician believes that a patient with a GCS of 14 is not at high risk (they are tired, or closing their eyes for some other reason than an organic alteration in mental status) then this guideline may be utilized, and the clinician may choose to wait until 2 hours from the injury to reassess GCS.

Anticoagulated patients

Due to the increased risk of intracranial hemorrhage, physicians should have a low threshold for imaging patients on blood thinners (anticoagulants) presenting with head injury. Patients on anti-coagulants (e.g. warfarin, rivaroxaban, dabigatran, etc) with minor head injury and an initial negative head CT seem to be at increased risk for delayed hemorrhage, although this does not appear to be true for those taking anti-platelet agents (e.g. aspirin, clopidogrel, etc). In addition, clinicians should consider checking INR, especially with perceived increased force of injury or other risk factors that indicate higher risk. Patients with INR>3 may be at increased risk for delayed ICH and should be considered for 24h observation depending on clinical scenario and practitioner gestalt.

Specifically:

1. If the initial CT head does not demonstrate signs of ICH, the clinician should have a discussion with the patient and/or family regarding the fact that, although rare, delayed intracranial hemorrhages occur and if concerning symptoms arise the patient should seek care immediately.
2. If the initial CT head is negative, but clinical judgment indicates a patient has an elevated risk of delayed ICH (e.g. INR >3.0):
 - a. The clinician may consider observing the patient for an extended period such as 6 hours (post-trauma), which ends with clinical reassessment. Repeat imaging may be considered as well.
 - b. Patients who are elderly or have an INR > 3.0 have been shown to have a slightly higher risk for delayed hemorrhage. For these patients and for patients without social support for home observation the clinician may also consider ED observation for up to 6 hours, or admission to an Observation Unit or a Neurosurgical/Trauma service for up to 24 hours post-trauma for clinical reassessment. Repeat imaging may also be considered.

If a patient sustains head trauma *during an inpatient hospital stay*, the clinician should use clinical judgment to determine if immediate imaging is necessary for the patient. At a minimum, head trauma precautions should be discussed, and these patients should be observed and reevaluated after an observation period such as 6 hours.

The Evidence

The Canadian CT Head Rule was derived and validated both internally and externally. The “major criteria” of these rules were 100% sensitive in ruling out the need for clinically important traumatic brain injury and reduced the need for Head CT scans by 68%. They were tested in 9,009 total patients through these three studies, where ~1.5% of the patients required neurosurgical intervention. ^(1, 2, 3)

Delayed intracranial hemorrhages have been reported in the literature for years, in which a patient on anticoagulants may have an initially normal head CT, but subsequently develop intracranial hemorrhage. Two recent studies looked more closely at this, suggesting approximately 0.5 – 5% of patients may experience delayed hemorrhage when on anticoagulants but that ~1% or less requires neurosurgical intervention or experiences an adverse outcome. Delayed hemorrhage may happen before or after 24 hours post-injury, and seem to be more likely in those with INR > 3 and in the elderly. There does not seem to be an increased risk of delayed hemorrhage among patients on anti-platelet agents. ^(4,5)

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4. Nishijima DK, Offerman SR, Ballard DW, Vinson DR, Chettipally UK, Rachwerger AS, Reed ME, Holmes JF; Clinical Research in Emergency Services and Treatment (CREST) Network. “Immediate and delayed traumatic intracranial hemorrhage in patients with head trauma and preinjury warfarin or clopidogrel use.” *Ann Emerg Med*. 2012 Jun;59(6):460-8.e1-7.

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