

MEDIC-Endorsed Use of Canadian CT Head Rule in Cases of Adult Minor Head Injury

Supplemental Material

What is MEDIC?

- The [Michigan Emergency Department Improvement Collaborative \(MEDIC\)](#) was launched in 2015 as an emergency physician-led quality improvement Collaborative comprised of hospitals across Michigan.
- MEDIC partners with emergency physicians who work together to collect and analyze data, identify best practices based on medical evidence, and improve collective performance.
- Participating EDs upload data to a clinical registry maintained by the MEDIC Coordinating Center.
- Support for MEDIC is provided by Blue Cross Blue Shield of Michigan and Blue Care Network within the [BCBSM Value Partnerships](#) program.

Why Standardize ED Guidelines for Head CT Use in Adults with Minor Head Injury?

- Overuse of head CT for minor head injury in the ED
 - *Cost, radiation exposure, overtreatment due to incidental findings*
- Stakeholder disagreement over indications for CT in minor head injury
 - *Inconsistent practice, even within a single healthcare system*
- Liability & risk associated with missing clinically important traumatic brain injury
 - *“The great variation in current practice and the fact that important lesions are being missed suggests the need for accurate and reliable guidelines.”¹*

¹ Stiell, IG et al. The Canadian CT Head Rule for patients with minor head injury. The Lancet. 2001;357(9266), pp.1391-1396

What is this rule?

- Internationally recognized
- Developed for the ED context
- Widely utilized as standard-of-care
- To improve ED evaluation of adult minor head injury
- Endorsed by MEDIC after careful, consensus-based vetting process

Canadian CT Head Rule

Head CT is ONLY INDICATED for adult minor head injury¹ patients WITH ANY ONE of the below²:

High Risk (for neurological intervention)

- GCS score <15 @ 2 hours after injury
- Suspected open or depressed skull fracture
- Any sign of basal skull fracture (hemotympanum, 'raccoon' eyes, cerebrospinal fluid otorrhea/rhinorrhea, Battle's sign)
- Vomiting ≥2 episodes
- Age ≥65 years

Medium Risk (for brain injury on CT)

- Amnesia before impact ≥30min
- Dangerous mechanism (pedestrian struck by motor vehicle, occupant ejected from motor vehicle, fall from height >3ft or 5 stairs)

¹ minor head injury: loss of consciousness, definite amnesia, or disorientation in patients with a GCS score of 13-15

² exclusions: use of antiplatelets or anticoagulants, pre-existing bleeding disorders, penetrating skull injury, acute focal neurological deficits, unstable vital signs associated with major trauma

Stiell, IG et al. The Canadian CT Head Rule for patients with minor head injury. *The Lancet*. 2001;357(9266), pp.1391-1396.

Why the *Canadian CT Head Rule*?



GOALS

Create shared understanding, standardize practice, and adhere to evidence-basis.
Provide for common measurement, comparisons, and basis for quality improvement.

RATIONALE

In head-to-head evaluations, the Canadian CT Head Rule out-performed other clinical decision rules, particularly the New Orleans Criteria, with equal sensitivity, but improved specificity.
Canadian CT Head Rule is well-known, widely recognized, and frequently in use in routine ED practice.

Stiell, IG *et al.* Comparison of the Canadian CT Head Rule and the New Orleans Criteria in Patients With Minor Head Injury. *JAMA*. 2005;294(12), pp.1511-1518

LITERATURE

Smits, S *et al.* External Validation of the Canadian CT Head Rule and the New Orleans Criteria for CT Scanning in Patients with Minor Head Injury. *JAMA*. 2005;294(12), pp.1519-1525

Ro, RS *et al.* Comparison of Clinical Performance of Cranial Computed Tomography Rules in Patients with Minor Head Injury: A Multicenter Prospective Study. *Academic Emergency Medicine*. 2011;18(6), pp.597-604.

What *defines* a minor head injury?

GOALS

To apply the Canadian CT Head Rule to the appropriate minor head injury population.

The original derivation of the Canadian CT Head Rule defined minor head injury as applying to patients who had symptoms of at least: loss of consciousness, definite amnesia, or disorientation.

However, in routine practice, the Canadian CT Head Rule is often applied to a broader, lower risk minor head injury population with minimal symptoms and who did not experience either loss of consciousness, amnesia, or disorientation.

Application of the Canadian CT Head Rule to a minor head injury population with minimal symptoms also identified all patients with intracranial hemorrhage and would still potentially reduce use of CT imaging.

RATIONALE

LITERATURE

Davey, K *et al.* Application of the Canadian Computed Tomography Head Rule to Patients with Minimal Head Injury. *Annals of Emergency Medicine*. 2018;72(4), pp.342-350

Why exclude patients on anticoagulant agents?

GOALS

To apply the Canadian CT Head Rule to the appropriate minor head injury population.

RATIONALE

The original derivation of the Canadian CT Head Rule excluded patients on warfarin (coumadin).

Newer direct oral anticoagulants (DOACs—*e.g.*, apixaban, dabigatran, rivaroxaban) have the same risk profile.

LITERATURE

Stiell, IG et al. The Canadian CT Head Rule for Patients with Minor Head Injury. *The Lancet*. 2001;357(9266), pp.1391-1396

Nishijima, DK *et al.* Immediate and Delayed Traumatic Intracranial Hemorrhage in Patients with Head Trauma and Preinjury Warfarin or Clopidrogel Use. *Annals of Emergency Medicine*. 2012;59(6), pp.460-468

Why *exclude patients on antiplatelet agents*?



GOALS

To apply the Canadian CT Head Rule to the appropriate minor head injury population.

RATIONALE

Antiplatelet agents (*e.g.*, clopidogrel, prasugrel, ticagrelor, aspirin), many of which were not developed at the time the original Canadian CT Head Rule was derived, increase the risk of intracranial hemorrhage in patients with minor head injury.

LITERATURE

Probst, MA *et al.* Prevalence of Intracranial Injury in Adult Patients with Blunt Head Trauma with and without Anticoagulant or Antiplatelet Use. *Annals of Emergency Medicine*. 2020;75(3), pp.354-364

Why *not* include intoxication?



GOALS

Assessment & documentation of GCS level on ED arrival & over time are more reliable, better indicators of risk than use of 'intoxication' as a proxy term.

Intoxication (which can reference a range of GCS levels varying from normal to abnormal) or *altered mental status* are unreliable terms with clinical meanings that vary across providers and locations. As a result, these terms are not always equivalent to a low GCS level.

RATIONALE

From the original Canadian Head CT Rule study: "...unreliable examination due to suspected intoxication was neither reliable nor discriminating and that serum ethanol concentration was not associated with important brain injury." ¹

LITERATURE

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Key References

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