

EXCLUDING SEVERE INTRACRANIAL INJURY IN ADULTS WITH MINOR HEAD TRAUMA

- Based on: [Easter JS, Haukoos JS, Meehan WP, Novack V, Edlow JA. Will Neuroimaging Reveal a Severe Intracranial Injury in This Adult With Minor Head Trauma? The Rational Clinical Examination Systematic Review. JAMA. 2015 Dec 22;314\(24\):2672-81.](#)
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- Published on December 6th 2016

■ KEY MESSAGES FROM THE PUBLICATION

- ➔ Although most adult patients with minor head trauma will not have a serious intracranial injury, CT scan is often used in the diagnosis process.
- ➔ The New Orleans Criteria and the Canadian CT Head Rule are two clinical decision rules which reliably detect adult patients with very low risk of serious intracranial injury. For these patients a CT can in this way be avoided.
- ➔ In a study population with a prevalence of 7.1% (95%CI: 6.8%-7.4%) of severe intracranial injury following a minor head trauma, the absence of any of the features of the Canadian CT Head Rule lowered the probability of severe injury to 0.31% (95%CI: 0%-4.7%). The absence of all the New Orleans Criteria findings lowered it to 0.61% (95%CI: 0.08%-6.0%).
- ➔ Combinations of history and physical examination features in clinical decision rules can identify patients with minor head trauma at low risk of severe intracranial injuries. Applying such clinical decision rules could allow limiting the number of CT Scans.

■ SUMMARY OF THE ORIGINAL PUBLICATION

Context

Traumatic brain injury is a heterogeneous disorder representing a spectrum of injuries ranging from concussions to devastating intracranial haemorrhages. Computed tomography (CT) is the gold standard for rapidly identifying intracranial injuries that require prompt intervention. Patients with a moderate (Glasgow Coma Scale*, GCS 9-12) or severe head trauma (GCS ≤8), should undergo emergency head CT to detect intracranial injuries because early interventions reduce morbidity and mortality. But the vast majority of head trauma (89%) are minor (GCS score 13-15 and minimal or no alterations of mental status). Although most patients with minor head trauma will not have a serious intracranial injury, many patients and

their physicians ignore cost and radiation exposure in favour of testing with CT.

A clinical decision rule facilitating a reliable detection of patients with very low risk of severe intracranial injury may allow to limit the number of CT Scans.

Up to date, two clinical decision rules have been validated and largely studied: the New Orleans Criteria and the Canadian CT Head Rules (see Table).



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KCE has read for you synthesises a recently published high-quality systematic review or health technology assessment with relevance for the Belgian health system.

The original publication was appraised and contextualised by KCE researchers.

KCE has read for you is not based on original research conducted by KCE.

More details on methodology can be found on the KCE website

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This document includes:



- **Key findings** of the publication under evaluation
- **A contextualisation** within the Belgian healthcare system



Not included:

- Recommendations
- Detailed descriptions



Trustworthy original publication

The methodological quality of the systematic review was assessed with the AMSTAR tool

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Tablea : Clinical Decision Rules to Rule out intracranial injuries

New Orleans criteria	Canadian CT Head Rule
1. Older than 60 years	1. 65 years or older
2. Any vomiting	2. Vomiting more than 1 episode
3. Persistent anterograde amnesia	3. Amnesia longer than 30 minutes
4. Visible trauma above the clavicle	4. Suspected open, depressed, or basilar skull fracture
5. Alcohol or drug intoxication	5. Dangerous mechanisms (pedestrian struck by vehicle, occupant ejected from vehicle, fall >1 m or 5 stairs)
6. Seizure	6. GCS <15 at 2 hours
7. Headache	
INTERPRETATION OF THE RULES Patients without any features of the rule are at low risk of severe intracranial injury. The decision to discharge, observe, or CT the patient with 1 or more features of a rule depends on the setting, clinician's judgment about the likelihood of injury, patient preference, number of features present, and the particular features present.	

Source: adapted from Easter JS et al. JAMA. 2015 Dec 22-29;314(24):2672-81.

Method

A systematic literature review was carried out up to August 2015. Studies on traumatic intracranial injury using a pre-specified selection strategy that focused on patients in which 50% or more of the participants were adults (≥18 years) with head trauma, who presented with GCS scores ranging from 13 through 15 were included. Diagnosis performance of the two decision rules was assessed only for severe intracranial injuries, i.e. injuries requiring prompt intervention (e.g. subdural, epidural, ventricular or parenchymal hematoma, subarachnoid haemorrhage, herniation, or depressed skull fracture).

Quality appraisal of studies was based on the Rational Clinical Examination Quality score and Quality Assessment tool for Diagnostic Accuracy Studies (QUADAS) score.

Results

The prevalence of severe intracranial injury in the 23 079 patients (14 studies) with minor trauma was 7.1% (95%CI: 6.8%-7.4%).

The absence of any findings of the rule suggests that the patient is at low risk of severe intracranial injury and typically does not require head CT. However, the effect of the rules on clinical practice is unclear as no included studies directly compared the performance of the rules to current practice or physician judgment.

In studies including patients with GCS scores of 13 to 15 and loss of consciousness, amnesia, or disorientation, the absence of any of the features of the Canadian CT Head lowers the probability of severe injury to 0.31% (95%CI: 0%-4.7%) (5 studies). The absence of all the New Orleans Criteria findings lowers the probability of severe intracranial injury to 0.61% (95%CI: 0.08%-6.0%) (5 studies).

Potential barriers to implementation that may limit the effect of the rules include physician concern that the rule does not work as well as clinical judgment, CT being perceived as the gold standard of care, medicolegal concerns.

In studies including patients with GCS scores of 13 to 15 regardless of the presence of loss of consciousness, amnesia, or disorientation, the results were not significantly different (2 studies).

KCE COMMENTS

Quality of the publication

Two KCE researchers independently appraised the quality of this review using the AMSTAR tool. The score obtained by the review was 8/11.

Of note, the precision around the point estimate may be considered low, as the upper bound of the 95%CI (4.7% for the Canadian CT head rule and 6.0% for the New Orleans Criteria) may deter physicians from using such rules as exclusion test.

Belgian context

There is currently no recommendation as regards the use of clinical decision rules in that domain in Belgium. Thus, the present KCE has read for you complements neatly the KCE report 261¹ which focused on the value of biomarkers to rule out the presence of intracranial injuries in case of minor traumatic brain injury. There are approximately 26 000 head trauma every year in Belgium, 79% to 90% of which are minor head trauma.

REFERENCE

- 1. San Miguel L, Benahmed N, Devos C, Fairon N, Roberfroid D. The role of biomarkers in ruling out cerebral lesions in mild cranial trauma. Health Technology Assessment (HTA) Brussels: Belgian Health Care Knowledge Centre (KCE). 2016. KCE Reports 261. D/2016/10.273/16.

* What is the Glasgow Coma Scale (GCS)?

This is a neurological scale giving a score from 3 to 15, allowing the evaluation of the level of consciousness and neurological functioning in patients after head injury.

See www.glasgowcomascale.org 

