Concussion/Minor Head Injury, Pediatric - Emergency Orders Reference

Name of Order Set: Concussion/Minor Head Injury, Pediatric - Emergency Orders Reference

Order Set Requirements: Age, Weight
Order Set Keywords: Head Injury, Concussion, Loss of Consciousness

Blood work, CT, MRIs and neuropsychology assessments are not routinely ordered in the diagnosis of concussion.

The majority of patients with minor head injuries do not require ANY imaging. If considering imaging please refer to the clinical decision rules linked below and under the Computed Tomography header.

Consider diagnostic imaging if:
- Glasgow Coma Scale (GCS) less than 15
- Signs of skull fracture, cervical spine and other orthopedic injuries
- Altered mental status (agitation, somnolence, slow response, repetitive questions)
- Vomiting (4 or more episodes)
- Scalp hematoma (excluding frontal)
- History of loss of consciousness
- Severe headache (not acting normal per parent)
- Severe mechanism of injury (fall more than 3 feet or 5 stairs, motor vehicle accident with ejection/rollover/fatality, bike/pediatric patient vs vehicle without a helmet, high impact injury to head)

Referrals to specialists are not required for most children with concussion.

SCAT for Sports Related Injury: https://bjsm.bmj.com/content/bjsports/early/2017/04/26/bjsports-2017-097506SCAT5.full.pdf

5P rule: www.5Pconcussion.com/en/scorecalculator to triage higher likelihood of requiring Specialist follow up.

Diet and Nutrition

- NPO
  - Frequency: Effective Now
  - NPO Except:
    - ☐ Ice Chips
    - ☐ Sips with meds
    - ☐ Sips of clear fluids
    - ☐ Other (specify)
  - Diet Comments:

- Pediatric Diet Options (*configuration note: age range of patient defaults in each order item*)
  - ☐ Pediatric Diet – Regular Diet
  - ☐ Pediatric Diet – Clear Fluids
  - ☐ Pediatric Diet – Full Fluids

☐ Pediatric Diet – Balanced Fluids
☐ Pediatric Diet – Diabetic Diet
☐ Pediatric Diet – Metabolic Diet
☐ Pediatric Diet – Ketogenic Diet

Patient Care

Precautions and Safety

☐ Spinal Motion Precautions
- ☐ Type (Full, Cervical, Lumbar, Thoracic):_____
- ☐ Log Roll
- ☐ Do Not Turn

Vital Signs

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~Start of ED Vital Signs Order Panel

☐ Vital Signs: These orders need to be re-evaluated when the patient stabilizes or by two hours, whichever occurs first.
- ☐ frequency as per Assessment and Reassessment of Patient Practice Support Document
- ☐ every _____ hourly
- ☐ every _____ minute(s)
- ☐ Continuous cardiac monitoring

☐ Neurological Vital Signs: Notify physician if Glasgow Coma Scale drops 2 or more points below the baseline score
- ☐ frequency as per Assessment and Reassessment of Patient Practice Support Document
- ☐ every _____ hourly
- ☐ every _____ minute(s)

~End of ED Vital Signs Order Panel

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Notify

☑ Notify physician if:
- Glasgow Coma Scale (GCS) decreases by 2 points,
- irritability
- severe or worsening headache
- vomiting
- change in focal neurologic signs

Blood work, CT, MRIs and neuropsychology assessments are not routinely ordered in the diagnosis of concussion

Laboratory Investigations Stat

Coagulation

For any patient with known bleeding disorder

☐ PT INR
☐ PTT

Urine Tests
For patients greater than 12 years old, if considering imaging and patient is unable to give history of last normal menstrual period (LNMP).
☐ Pregnancy Test, Urine - POCT

Diagnostic Imaging
If a pediatric patient requires a CT head, skull radiographs are unnecessary. If you are considering a skull radiograph, consultation with a pediatric centre is recommended to avoid unnecessary radiation exposure.

General Radiology
☐ GR Cervical Spine, Reason for exam: Suspected cervical injury

Computed Tomography

The Canadian Assessment of Tomography for Childhood Head Injury 2 (CATCH2) Rule
CT of the head is required for children with minor head injury and any 1 of the following findings:*
- Glasgow Coma Scale (GCS) score less than 15 at 2 hours after injury
- Suspected open or depressed skull fracture
- History of worsening headache
- Irritability on examination
*- Any sign of basal skull fracture**
- Large, boggy hematoma of the scalp
*- Dangerous mechanism of injury**
- Greater than or equal to: 4 episodes of vomiting

** Minor head injury is defined as injury within the past 24 hours associated with witnessed loss of consciousness, definite amnesia, witnessed disorientation, persistent vomiting (greater than 1 episode) or persistent irritability (in a child aged less than 2 years) in a patient with a GCS score of 13–15.*
** Signs of basal skull fracture include hemotympanum, raccoon eyes, otorrhea or rhinorrhea of the cerebrospinal fluid, and Battle sign.*
** Dangerous mechanism is a motor vehicle crash, a fall from elevation greater than or equal to 3 ft (greater than or equal to 91 cm) or 5 stairs, or a fall from a bicycle with no helmet.*

Our bootstrap analysis (1000 replications) for the CATCH2 rule using the derivation data[6] had a sensitivity of 100% (95% CI 100%–100%) and a specificity of 35.6% (95% CI 34.0%–37.1%) for neurosurgical intervention, whereas the sensitivity for brain injury on CT was 99.4% (95% CI 97.9%–100%) and the specificity was 36.9% (95% CI 35.2%–38.4%).
The potential impact of the rule was assessed by comparing the CT rate according to the CATCH rule to the actual clinical practice of the physicians at the 9 sites. For the 4060 enrolled patients, the CT rate according to the CATCH rule was 43% and the CT ordering rate by the physicians was 35%. Using the CATCH2 rule, the CT ordering rate would be 55%.
One case of brain injury would have been missed using the CATCH2 rule. This was an adolescent whose occiput struck the ground after a tackle. The patient had loss of consciousness for 2 minutes.

Osmand, M., Klassen, T., Wells, G., Davidson, J., Correll R., Boutis, K., Joubert, G., Gouin, S., Khangura, S., Turner, T., Belanger, F., Silver, N., Taylor, B., Curran, J., & Stiell, I. (2018). Validation and refinement of a clinical decision rule for the use of computed

tomography in children with minor head injury in the emergency department. Canadian Medical Association Journal, 190 (27) E816-E822; DOI:https://doi.org/10.1503/cmaj.170406

Pediatric NEXUS is less widely validated than PECARN.

PECARN: Pediatric Head Injury/Trauma Algorithm: https://www.mdcalc.com/pecarn-pediatric-head-injury-trauma-algorithm

CATCH 2 study: https://www.cmaj.ca/content/190/27/E816

Canadian CT Head Rule*:* https://www.mdcalc.com/canadian-ct-head-injury-trauma-rule

Pediatric NEXUS 2 Head CT Decision Instrument for Blunt Trauma: https://www.mdcalc.com/pediatric-nexus-ii-head-ct-decision-instrument-blunt-trauma

☐ CT Head, Reason for exam: for suspected intracranial injury
☐ CT Cervical Spine, Reason for exam: for suspected spinal injury

Magnetic Resonance
☐ MR Brain, Reason for exam: for suspected intracranial lesion or spinal injury

Other Tests

Cardiology
☐ Electrocardiogram – 12 Lead

Medications

Analgesics and Antipyretics
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~Start of Pediatric Fever/ Mild Pain Smart Group

☐ acetaminophen

○ acetaminophen (infants)

acetaminophen liquid (15 mg/kg/dose) _____ mg PO q4 for mild pain. Max 75 mg/kg/day, 1000mg/dose and 4 grams/day Max 5 doses in 24 hours

OR (linked order)

acetaminophen suppository (20 mg/kg/dose) _____ mg PO q4 for mild pain. Max 75 mg/kg/day, 1000mg/dose and 4 grams/day Max 5 doses in 24 hours

○ acetaminophen (children)

acetaminophen liquid (15 mg/kg/dose) _____ mg PO q4 for mild pain. Max 75 mg/kg/day, 1000mg/dose and 4 grams/day Max 5 doses in 24 hours

OR (linked order)

acetaminophen chew tab (15 mg/kg/dose) _____ mg PO q4 for mild pain. Max 75 mg/kg/day, 1000mg/dose and 4 grams/day Max 5 doses in 24 hours

OR (linked order)
acetaminophen tab (15 mg/kg/dose) _____ mg PO q4 for mild pain. Max 75 mg/kg/day, 1000mg/dose and 4 grams/day Max 5 doses in 24 hours

OR (linked order)
acetaminophen suppository (20 mg/kg/dose) _____ mg PO q4 for mild pain. Max 75 mg/kg/day, 1000mg/dose and 4 grams/day Max 5 doses in 24 hours

☐ ibuprofen

Use caution in infants < 4 months. (Considered off-label use) and children with dehydration (as limited safety data are available for this group)

Usual max dose 400 mg per dose, with a daily maximum of 40 mg/kg/day or 2400 mg/day, whichever is less.

- ○ ibuprofen (infants greater than 4 months)

  ibuprofen liquid (10 mg/kg/dose)_____ mg every 6 hours as needed for mild pain, temperature greater than 37.5

- ○ ibuprofen (children)

  ibuprofen liquid (10 mg/kg/dose)_____ mg every 6 hours as needed for mild pain, temperature greater than 37.5

  OR (linked order)
  ibuprofen tablet (10 mg/kg/dose)_____ mg every 6 hours as needed for mild pain, temperature greater than 37.5

~End of Pediatric Fever/ Mild Pain Smart Group
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Antiemetics

Ondansetron should be used as a single dose in most situations. Multiple doses, especially IV, can lead to QT prolongation.

Ondansetron dose guidance:
- *8-15 kg: 2 mg/dose*
- *Greater than 15-30 kg: 4 mg/dose*
- *Greater than 30 kg: 8 mg/dose*

☐ ondansetron 0.8 mg/ml liquid oral (*recommended dose 0.1 mg/kg/dose*) _____ mg PO every 8 hours PRN for nausea/vomiting
☐ ondansetron tablet (*recommended dose 0.1 mg/kg/dose*) _____ mg PO every 8 hours PRN for nausea/vomiting
☐ ondansetron DISINTEGRATING tablet (*recommended dose 2 mg*)____mg PO every 8 hours PRN for nausea/vomiting
☐ ondansetron oral disintegrating tablet (*recommended dose 2 mg/dose*) _____ mg PO every 8 hours PRN for nausea/vomiting

Consults/Referrals
Recommendation for return to play is to be seen by a physician or provider who can exam and provide clearance.

Immediate Consults
☐ Pediatric Inpatient Services/Hospitalist
☐ Neurosurgery