

Educational Tool

PECARN for Pediatric Head CT for Minor Head Trauma

Overview

Minor head injuries occur commonly in children and adolescents. Approximately 50% of children who visit hospital emergency departments with a head injury are given a CT scan, many of which may have been able to be treated with observation. Exposure to radiation increases the lifetime risk of cancer because a child's brain tissue is more sensitive to ionizing radiation. Clinical observation prior to CT decision-making for children with minor head injuries is an effective approach when the PECARN Pediatric Head Injury/Trauma algorithm is paired with physician judgementⁱ.

The PECARN Pediatric Head Injury/Trauma Algorithm was developed by the Pediatric Emergency Care Applied Research Network and is supported by cooperative agreements between seven academic medical centers and the Health Resources Services Administration/Maternal and Child Health Bureau/Emergency Medical Services for Children Program (HRSA/MCHB/EMSC). The PECARN Pediatric Head Injury/Trauma Algorithm applies only to patients with a Glasgow Coma Scale of 14 or higher.

Using the PECARN Pediatric Head Injury/Trauma Algorithm

1. Use the Glasgow Coma Scale (GCS) to determine if the pediatric patient fits the required criteria for evaluation using the PECARN algorithm.

The Glasgow Coma Scale is based on a 15 point scale for estimating and categorizing the outcomes of brain injury on the basis of overall social capability or dependence on others. The minimum score is 3 points which designates a deep coma or brain death. The test measures the motor response, verbal response and eye opening response with these valuesⁱⁱ.

I. Motor Response

- 6 – Obeys commands fully
- 5 – Localizes to noxious stimuli
- 4 – Withdraws from noxious stimuli
- 3 – Abnormal flexion, i.e. decorticate posturing
- 2 – Extensor response, i.e. decerebrate posturing
- 1 – No response

II. Verbal Response

- 5 – Alert and Oriented
- 4 – Confused, yet coherent, speech
- 3 – Inappropriate words and jumbled phrases consisting of words
- 2 – Incomprehensible sounds
- 1 – No sounds

III. Eye Opening

- 4 – Spontaneous eye opening
- 3 – Eyes open to speech
- 2 – Eyes open to pain
- 1 – No eye opening

2. Determine the GCS by adding the values of I+II+III.

This number helps medical practitioners categorize the four possible levels for survival, with a lower number indicating a more severe injury and a poorer prognosis:

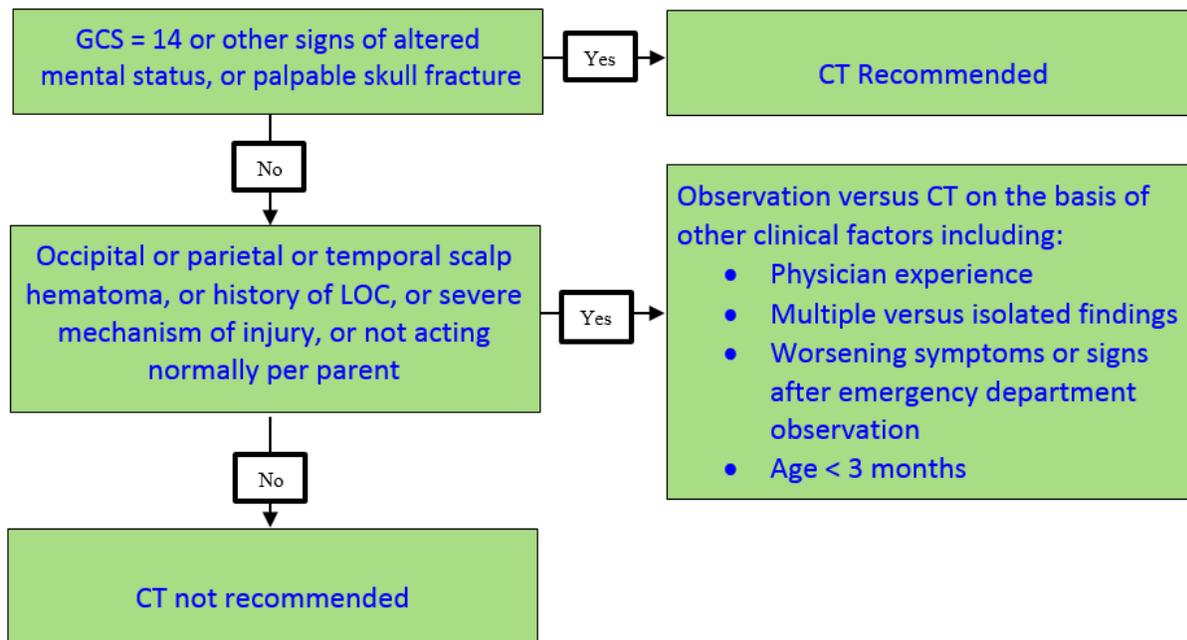
Mild = GCS Score of 13-15:

Moderate Disability = GCS Score of 9-12:

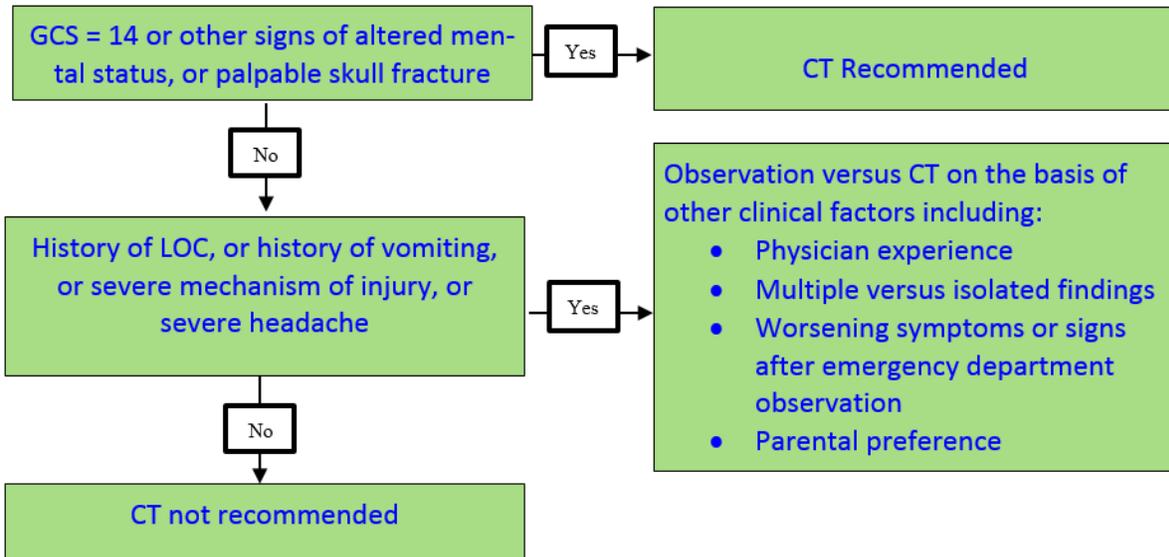
Severe Disability = GCS Score of 3-8:

3. Apply the PECARN Pediatric Head Injury/Trauma algorithm and validate your recommendation with your clinical findings.

For ages less than 2: (adapted from Kupperman, et al)



For ages greater than 2: (adapted from Kupperman, et al)



3. If the pediatric patient does not need a head CT, observation is recommended for the patient's current condition.

References

1. Kupperman, Nathan, et al. "Identification of children at very low risk of clinically-important brain injuries after head trauma: a prospective cohort study." *The Lancet*. 03 October (2009): 1160-1170. Web. 18 June 2014.

ⁱ "Choosing Wisely." *American Academy of Pediatrics*. June (2014). Web. 18 June 2014.

ⁱⁱ "ABA: Glasgow Coma Scale – Definition." *Open Anesthesia*. Web. 14 July 2014.