Clinical Update

For Telephone Triage Nurses

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Head Injuries in Children

New Rules for Predicting Serious Head Injuries

A recent US study analyzed 42,412 patients younger than 18 years presenting to the emergency department within 24 hours of head injury. (Kuppermann 2009)

Data was obtained across 22 hospitals within the Pediatric Emergency Care Applied Research Network in the U.S. Results: This study identified the risk factors for intracranial complications and those children who need to be sent in for evaluation. If all of these risk factors are absent, the negative predictive value is 100% for clinically important traumatic brain injury.

Risk Factors from the History

- Presence of altered mental status (amnesia, slow responsiveness, etc)
- Loss of consciousness over 5 seconds
- Severe headache
- Any vomiting
- Parental report of abnormal behavior

Risk Factors from the Examination

- Scalp hematoma other than frontal (for children under 2 years)
- Signs of basilar skull fracture (blood or CSF from ear or nose, panda eyes, etc)

Risk Factors - Severe Mechanism of Injury

- MVC with ejection from motor vehicle, death of other passenger, rollover
- Pedestrian or un-helmeted bicyclist struck by motor vehicle
- Fall over 5 feet if 2 years or older
- Fall over 3 feet if under 2 years
- Struck by high-impact object (e.g., golf club or baseball bat)

What's Changed Since the 2006 UK Study?

The UK rule was based upon a study of 22,772 children with head injuries.(Dunning 2006) The US study lists any vomiting as a risk factor. In the UK study, vomiting 3 or more times was listed as a risk factor. Our pediatric guideline uses vomiting 2 or more times as an indicator to be seen (an average of the 2 studies). The US study found that large bruises on the forehead did not correlate with intracranial injuries. The UK study was concerned about any hematomas over 5 cm (2 inches) if under 1 year old. The studies also differed on height of falls.

Dangerous Falls - How to Assess

- Falls: Ground-level falls or running into a stationary object are not considered to be high risk. Free-falls from a substantial height are considered high risk. What is a dangerous height?
- The US study (2009) defined these heights as over 3 feet for children younger than 2 years, and over 5 feet for those older than 2 years. The UK study (2006) defined the height as twice the child's height or over 10 feet for school-age children.
- Our forthcoming 2010 pediatric guideline will use the more conservative cutoffs (3 and 5 feet).
- I did some measuring to help us put this into perspective: Countertops are usually 3 feet. Washers and dryers, shopping carts and from parent's arms are usually over 3 feet. Tables and desks are usually 2 ½ feet. Highchair seats are usually 2 feet.
- Falls down stairways: Since most children roll down the stairs, these accidents are not equivalent to free falls. We are most concerned about pre-verbal children younger than 2 years. They probably need to be seen if they fall down 6 or more stairs. Reason: standard stair risers are 6 inches each, so 6 stairs equals 3 feet. If a child is in a walker at the time, the risk for a serious injury is greatly increased. Children over age 2 can be triaged on the basis of symptoms. Nurse judgment is required in these cases. A steep concrete stairway is dangerous at any age.

Summary

- The US and the UK prospective studies on risk factors for intracranial complications gave similar results. Rest assured, that all of the identified risk factors are included in the pediatric Head Trauma guideline.
- Despite these advances in evidence-based rules, telephone triage still requires nursing judgment and common sense.

Best wishes for a pandemic-free year,

Bart Schmitt, MD

Schmitt-Thompson Clinical Content

References:

- Dunning J, Daly P, Lomas J, et.al. Derivation of the children's head injury algorithm for the prediction of important clinical events decision rule for head injury in children. Arch DisChild. 2006;21:885-891.
- Kuppermann N, Holmes JF, Dayan PS, et al. Identification of children at very low risk of clinically-important brain injuries after head trauma: a prospective cohort study. Lancet. 2009; 374 (9696):1160-1170.