

# Large study finds CT scans are frequently unnecessary after head injury in children

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Overall, roughly half of U.S. children taken to hospital emergency departments (EDs) for a head injury receive a head CT scan, often to ease worried parents' concerns. Yet true traumatic brain injury is uncommon. A multi-center study of more than 40,000 children with minor blunt head trauma, led by Children's Hospital Boston and UC Davis, shows that allowing a period of observation can reduce the use of head CT by as much as half without compromising care – and without exposing children to ionizing radiation. Results appear in the June 2011 issue of *Pediatrics* (published online May 9).

"Only a small percentage of [children](#) with blunt head trauma really have something serious going on," says Lise Nigrovic, MD, MPH, of Children's Hospital Boston, who co-led the study with Nathan Kuppermann, MD, MPH, chair of the Department of Emergency Medicine at UC Davis. "If you can be watched in the ED for a few hours, you may not need a CT."

This change in practice would not only be cost-saving, but is better medicine, the researchers say.

Nigrovic, Kuppermann and colleagues analyzed the outcomes of children presenting at 25 different emergency departments, as part of a large prospective study conducted by the Pediatric Emergency Care Applied Research Network (PECARN). Of 40,113 children whose records could be analyzed, 5,433 (14 percent) were observed before making a decision about CT use. Observation times varied, as did the severity of head

trauma.

Overall, the children who were observed had a lower rate of CT than those not observed (31 vs. 35 percent). When the researchers matched the observed and non-observed groups for severity of head injury and the practice style of different hospitals, this difference was more pronounced: The likelihood of a [CT scan](#) in the observed group was about half that of similar non-observed patients (odds ratio, 0.53). In particular, children whose symptoms improved during observation were less likely to eventually have CT.

Allowing for an observation period did not compromise safety, the study found: Clinically important [traumatic brain injury](#) -- resulting in death, neurosurgical intervention, intubation for more than 24 hours or hospital admission for two nights or more -- was equally uncommon in the observed and non-observed groups (0.75 vs. 0.87 percent).

Nigrovic and Kuppermann note that cranial CT itself presents additional risks for children. Children's growing brain tissue is more sensitive to ionizing radiation than adults', and because of their longer life expectancy, their lifetime risk of developing a radiation-induced malignancy is greater.

"CT isn't bad if you really need, but you don't want to use it in children who are at low risk for having a significant injury," says Nigrovic. "For [parents](#), this means spending a couple of extra hours in the ED in exchange for not getting a CT. It's the children in the middle risk groups -- those who don't appear totally normal, but whose injury isn't obviously severe -- for whom observation can really help."

The researchers were unable to determine the actual length of time the children were observed in the ED, a question they would like to investigate in the future. Practice guidelines from the American

Academy of Pediatrics recommend a child be carefully observed for 4 to 6 hours after injury.

"There is a clear need to develop appropriate and safe guidelines for decreasing the number of inappropriate head CT scans that we do on children," says Kuppermann. "The results of this analysis demonstrate that a period of observation before deciding to use head CT scans on many injured children can spare children from inappropriate radiation when it is not called for, while not increasing the risk of missing important brain injuries."

Nigrovic offers the following general guidelines for parents whose child has a head injury:

- Check with your primary care clinician before taking the child to the ED.
- If your child has headache, vomiting and/or confusion, or symptoms that worsen over time, an ED visit is appropriate.
- The ED clinician may reasonably choose to observe your child for several hours once you arrive before deciding about a head CT.
- The change of symptoms over time is an important factor in deciding whether to obtain a cranial CT.

Provided by Children's Hospital Boston

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