

Predicting Intracranial Traumatic Findings on Computed Tomography in Patients with Minor Head Injury: The CHIP Prediction Rule

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The full report is titled “Predicting Intracranial Traumatic Findings on Computed Tomography in Patients with Minor Head Injury: The CHIP Prediction Rule.” It is in the 20 March 2007 issue of *Annals of Internal Medicine* (volume 146, pages 397-405). The authors are M. Smits, D.W.J. Dippel, E.W. Steyerberg, G.G. de Haan, H.M. Dekker, P.E. Vos, D.R. Kool, P.J. Nederkoorn, P.A.M. Hofman, A. Twijnstra, H.L.J. Tanghe, and M.G.M. Hunink.

What is the problem and what is known about it so far?

Even a relatively minor blow to the head can lead to serious trouble if it causes bleeding in or around the brain. The brain is a soft organ. It is covered with blood vessels that can be damaged when the brain moves rapidly within the skull as a result of a severe blow to the head, such as when a person’s head strikes the pavement after falling off a moving bicycle. During the fall, the body, including the brain, moves rapidly through the air. When the head strikes the pavement, the skull stops suddenly, but the brain keeps moving rapidly until it strikes the inside of the skull. The resulting forces can rupture blood vessels or fracture the skull. When blood collects in the small space between the brain and the skull, it presses against the brain and pushes it against the skull. The resulting pressure can severely damage the brain unless a neurosurgeon removes the blood. Fortunately, blood is easy to detect with a computed tomography (CT) scan. When emergency department doctors see patients with head injuries, even a minor bump on the head, they usually order a CT scan of the head to be sure that blood is not present. Methods that use a patient’s history and examination can identify patients who have enough damage to cause bleeding. Clinical prediction rules can identify patients who have a head injury that is bad enough to cause them to lose consciousness. Many patients do not lose consciousness after a head injury, and these rules might not be safe to use in them.

Why did the researchers do this particular study?

To develop a rule to help patients with serious brain damage or bleeding after head injury, regardless of whether they lost consciousness.

Who was studied?

Adults who came to the emergency department within 24 hours after a blunt injury to the head and with few or no signs of brain damage.

How was the study done?

A neurologist took the patient’s history and examined the patient before a CT scan was performed. The authors examined hospital records to determine whether the patient required neurosurgery and obtained information about the outcome of their injury.

What did the researchers find?

Of 3181 patients, 243 (7.6%) had CT scans that showed evidence of brain trauma, bleeding, or skull fracture. Seventeen patients required a neurosurgical operation. The authors found 10 major predictors of brain damage on CT scan or need for neurosurgery and 8 minor predictors. All patients who required neurosurgery had at least 1 major predictor or at least 2 minor predictors. Ninety-six percent of patients who had evidence of brain damage, bleeding, or skull fracture on CT scan had at least 1 major predictor or at least 2 minor predictors.

What were the limitations of the study?

The authors did not test the rule to see how well it worked in a new group of patients with blunt head injury.

What are the implications of the study?

If a patient with head injury has at least 1 major or at least 2 minor predictors of serious injury, he or she should receive a CT scan. Patients without these findings have little chance of a serious brain injury or bleeding, and they may not need a CT scan. Not doing a CT scan in these patients would reduce the cost of caring for patients with head injury.

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