

**Title:**

The Use of Radiographic Neuroimaging in Pediatric Minor Head Trauma

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**Session Title:**

Rising Stars of Research and Scholarship Invited Student Posters

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**Keywords:**

PECARN criteria, neuroimaging and pediatric head injury

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**Abstract Summary:**

Head injury is a leading cause of morbidity and mortality in the global pediatric population. While Head CT is the preferred imaging modality to guide management, it contains inherent risks of radiation-induced malignancy. The PECARN criteria can identify clinically important injuries and can obviate potentially unnecessary radiation exposure.

**Learning Activity:**

LEARNING OBJECTIVES	EXPANDED CONTENT OUTLINE
The learner will be able to determine the circumstances for the use of radiographic neuroimaging versus observation in pediatric patients who experienced minor head trauma presenting to the emergency room.	Education on the content of the PECARN criteria.
The learner will be able to articulate why head CT should not be used indiscriminately for pediatric patients with minor head injuries.	Discussion about the inherent risk of radiation-induced malignancy and possible impaired neurodevelopment outcomes associated with head CT, as well as discussion about the PECARN algorithm as a highly significant, well-validated clinical decision aid that can help identify clinically important traumatic brain injuries, thereby potentially obviating

	unnecessary radiation exposure, which can have lifelong consequences.
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**Abstract Text:**

Head injury is a leading cause of morbidity and mortality in the pediatric population worldwide. Falls are the most common cause of accidental injury, followed by motor vehicle accidents. The majority of pediatric closed head injuries are mild, do not require specific therapy and do not have sequelae. Nonetheless, it is important to identify those who are at risk for serious injury and need further evaluation. Because prompt management of TBI is essential to improve the clinical course and reduce sequelae, especially within 48 hours of the injury, neuroimaging techniques that determine the severity of the injury and guide therapy are critical in the diagnostic process. Head CT is the preferred imaging modality during the first 24 hours post injury due to its rapid detection of acute hemorrhage, but contains inherent risks of radiation-induced malignancy.

While anatomical imaging with magnetic resonance imaging (MRI), which does not deliver radiation, is very sensitive, it is usually considered superior to computed tomography (CT), only at 48-72 hours after the injury. Additionally, it often requires sedation in children due to the length of the examination and motion sensitivity, limiting rapid assessment and exposing patients to potential anesthesia risks. Neither PET nor SPECT imaging is used routinely as they have limited availability and are lengthier procedures and provide more functional rather than anatomical information. Therefore, the use of CT which is cost effective, more available, requires shorter time and can be performed on ventilated or agitated patients, is the initial imaging modality of choice during the first 24 hours after the injury due to its rapid detection of acute hemorrhage from traumatic head injury.

The goal of this project is to safely reduce the unnecessary use of CT scans following pediatric head injury by using an evidence-based decision tool, to establish which patients require neuroimaging and which patients can be managed conservatively. This tool can obviate unnecessary radiation exposure, which can have lifelong consequences. After extensive literature review, the guideline that best meets the needs of pediatric patients with minor head injuries is the PECARN Head Injury Decision Rule.

The study was conducted by the Pediatric Emergency Care Applied Research Network and was co-funded by the Health Resources and Services Administration's (HRSA) Maternal and Child Health Bureau (MCHB) Emergency Medical Services for Children (EMSC) Program and the Research Program. Two clinical decision rules were derived, one for children < 2 years and one for children > 2 years. The PECARN head injury criteria have been both internally and externally validated to accurately identify those children at low risk for clinically important TBI for whom neuroimaging is not warranted and been determined reliable by the National Institute of Health.