

## Evaluating PECARN-based appropriateness for head CT for leveled traumas in pediatric emergency medical care: a multi-disciplinary quality improvement project

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**Background:** Results from computed tomography (CT) in leveled pediatric trauma patients can provide data critical for clinical decision-making. However, in this radio-sensitive population, significant opportunity exists to reduce healthcare waste and potential harm from ionizing radiation by using evidence-based risk stratification tools, such as the 2009 Pediatric Emergency Care Applied Research Network (PECARN) guidelines. Based on anecdotal reports from providers at our institution, we hypothesized that the rates of CT imaging in pediatric trauma patients presenting to the Duke University Hospital ED is higher than the national average.

**Methods:** We identified a retrospective cohort of pediatric (<15 yo) leveled (1, 2, or 3) traumas using Performance Services (PSWeb) dashboards to quantify the rate of head CT requesting in pediatric trauma activations 7/1/2022 to 11/30/2023 and evaluate adherence to PECARN.

**Results:** Of 420 total ED pediatric trauma activations, a head CT was completed in 47% (197/420), more than double the national average of 20%. The most common injury mechanisms for which head CT was ordered were non-accidental trauma (NAT) in children < 2 yo (61% of 114 total) and motor vehicle crash in children ≥ 2 yo (51% of 306 total). Notably, head CT was most common in level 1 (39/70; 56%) and level 2 traumas (20/31; 65%) and children < 1yo (57/86; 66%). Of the 197 patients undergoing head CT, we excluded 57 (57/197; 29%) for whom imaging was ordered as NAT workups, as PECARN does not apply. Of the 140 non-NAT traumas, 29% (n=39) were classified as low risk per PECARN, 38% (n=54) as intermediate risk, and 34% (n=47) as high risk (**Figure 1**). Furthermore, no patients in the low-risk group and only 4 patients in the intermediate risk group had clinically significant head CT findings (versus 19/47, or 40%, of patients in the high-risk group). Of the 4 with significant head CT findings, only one required surgery for skull fracture repair; none died from injuries, and all were doing well upon follow-up.

**Conclusions:** Our institutional rate of head CT for pediatric leveled traumas (47%) was found to be notably higher than the national average. Per PECARN, 66% of patients in this cohort for which head CT was ordered could have avoided the radiation altogether (low risk) or been safely observed for 4-6 hours (intermediate risk). Additionally, infants, the most vulnerable population to the adverse effects of radiation, had the highest rate of head CTs. Given our high rates of head CT imaging, we have developed a multi-disciplinary quality improvement team to further characterize factors influencing rates of PECARN adherence. Results of this initial analysis will inform the development of targeted quality improvement interventions (i.e., printed PECARN guidelines, EMR decision tools) for pediatric imaging at our institution in the future.

**Figure 1.** PECARN head CT adherence for pediatric leveled traumas at Duke (7/2022-11/2023).

