Computed tomography overuse in children

Increased use of computed tomography (CT) in children is concerning owing to the cancer risk from ionizing radiation, particularly in children younger than 2 years. A guardian report that a child is acting abnormally is a risk factor for clinically important traumatic brain injury and may be a driving factor for CT use in the emergency department.

The overuse of CT leads to inefficient care. Therefore, to maximize precision and minimize the overuse of CT, the Pediatric Emergency Care Applied Research Network (PECARN) previously derived clinical prediction rules for identifying children at high risk and very low risk for intra-abdominal trauma undergoing acute intervention and clinically important traumatic brain injury after blunt trauma in large cohorts of children who are injured.

A study aimed to validate the IAI and age-based TBI clinical prediction rules for identifying children at high risk and very low risk for IAIs undergoing acute intervention and clinically important TBIs after blunt trauma.

This was a prospective 6-center observational study of children aged <18 years with the blunt torso or head trauma. Consistent with the original derivation studies, enrolled children underwent a routine history and physical examinations, and the treating clinicians completed case report forms prior to knowledge of CT results (if performed). Medical records were reviewed to determine clinical courses and outcomes for all patients, and for those who were discharged from the emergency department, a follow-up survey via a telephone call or SMS text message was performed to identify any patients with missed IAIs or TBIs. The primary outcomes were IAI undergoing acute intervention (therapeutic laparotomy, angiographic embolization, blood transfusion, or intravenous fluid for ≥2 days for pancreatic or gastrointestinal injuries) and clinically important TBI (death from TBI, neurosurgical procedure, intubation for >24 hours for TBI, or hospital admission of ≥2 nights due to a TBI on CT). Prediction rule accuracy was assessed by measuring rule classification performance, using a standard point and 95% CI estimates of the operational characteristics of each prediction rule (sensitivity, specificity, positive and negative predictive values, and diagnostic likelihood ratios).

The project was funded in 2016, and enrollment was completed on September 1, 2021. Data analyses are expected to be completed by December 2022, and the primary study results are expected to be submitted for publication in 2023.

This study will attempt to validate previously derived clinical prediction rules to accurately identify children at high and very low risk for clinically important intra-abdominal trauma and traumatic brain injury. Assuming successful validation, widespread implementation is then indicated, which will optimize the care of children who are injured by better aligning CT use with need.

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