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Accuracy of Physician Practice as compared to PECARN, CATCH and CHALICE head injury decision rules in children. A PREDICT prospective cohort study.


Aims:
Clinical decision rules (CDRs) can assist in determining the need for computed tomography (CT) in children with head injuries (HIs). We assessed the accuracy of 3 high quality CDRs (PECARN, CATCH and CHALICE) in a large prospective cohort of head injured children. In addition to rule accuracy, however, among a number of factors physician accuracy is also important when determining whether a particular rule should be implemented. The objective of the study was to assess the accuracy of physician practice in detecting clinically important traumatic brain injuries.

Methods:
Prospective observational study of children <18 years with HIs of any severity at 10 mainly tertiary Australian/New Zealand centres. We extracted a cohort of children with mild HIs (GCS 13-15, presenting <24h) and assessed physician accuracy for the standardised outcome of clinically important traumatic brain injury (ciTBI) and compared this with the accuracy of PECARN, CATCH and CHALICE. Physician accuracy was defined as CT obtained during the initial ED visit.

Results:
Of 20,137 children, 18,913 had a mild HI as defined. Of these 1,578 (8.3% = actual CT rate) received a CT scan during the ED visit, 160 (0.8%) had ciTBI and 24 (0.1%) underwent neurosurgery. Physician practice for detecting ciTBI based on CT performed had a sensitivity of 157/160 ((98.1% (94.6% - 99.6%) and a specificity of 17,332/18,753 (92.4% (92.0% - 92.8%)). Sensitivity of PECARN <2 years was 42/42 (100.0%, 91.6% to 100.0%), PECARN >2 years 117/118 (99.2%; 95.4% to 100.0%), CATCH (high/medium risk) 147/160 (91.9%; 86.5% to 95.6%) and CHALICE 148/160 (92.5%; 87.3% to 96.1%). Projected CT rates for PECARN <2/2 years was 8.0%/9.4% (high risk only) to 41.4%/48.5% (high and intermediate risk, considering the unlikely scenario that all patients in the intermediate risk group receive a CT scan), CATCH 30.2% (medium and high risk) and CHALICE 22.0%.

Conclusions:
Physician accuracy was high. The application of PECARN, CATCH or CHALICE CDRs in this setting has the potential to increase the CT rate with limited potential to increase the accuracy of detecting ciTBI.