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**DEVELOPMENT OF A CLINICAL DECISION RULE FOR THE EARLY SAFE DISCHARGE OF PATIENTS WITH MILD TRAUMATIC BRAIN INJURY AND FINDINGS ON CT BRAIN SCAN: A RETROSPECTIVE COHORT STUDY**

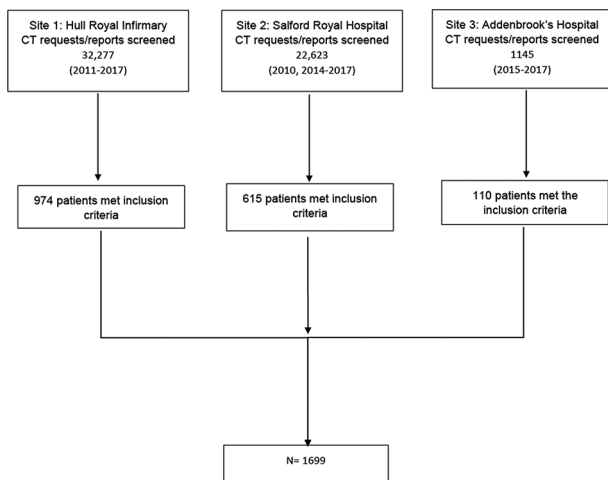
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**Background** International guidelines recommend routine hospital admission for all patients with mild traumatic brain injury (TBI) who have injuries on CT brain scan. Only a small proportion of these patients require neurosurgical or critical care intervention. We aimed to develop an accurate clinical decision rule to identify low risk patients safe for discharge from the emergency department (ED) and facilitate earlier referral of those requiring intervention.

**Method and results** A retrospective cohort study of case-notes of patients admitted with initial GCS13-15 and injuries identified by CT was completed. Data on a primary outcome measure of clinically important deterioration (indicating need for hospital admission) and secondary outcome of neurosurgery, ICU admission or intubation (indicating need for neurosurgical admission) were collected. Multivariable logistic regression was used to derive models and a risk score predicting deterioration using routinely reported candidate variables identified in a systematic review. We compared the performance of this new risk score with the Brain Injury Guideline (BIG) criteria, derived in the USA.

**Conclusions** 1699 patients were included from 3 English Major Trauma Centres. 27.7% (95% CI: 25.5% to 29.9%) met the primary, and 13.1% (95% CI: 11.6% to 14.8%) met the secondary, outcome of deterioration. The derived clinical decision rule suggests that patients with simple skull fractures or intracranial bleeding less than 5 mm in diameter who are fully conscious could be safely discharged from the Emergency



Abstract 049 Figure 1 Population selection

Abstract 049 Table 1 Model performance

Outcome	Measure	Apparent Performance	Average Optimism	Optimism Adjusted
Clinical Deterioration	Brier Score	0.16		
	Calibration Slope	1	0.14	0.86
	C-statistic	0.773	0.026	0.747
Need for specialist neurosurgical admission	Brier Score	0.09		
	Calibration Slope	1	0.04	0.96
	C-statistic	0.86	0.01	0.85

Abstract 049 Table 2 Performance of risk score and BIG criteria

N=1569	Deteriorated	Didn't deteriorate	Positive Predictive Value (Negative Predictive Value)
<b>Performance of Risk score</b>			
Admission (Score>0)	423	1059	PPV = 28.5%
Discharge (Score≤0)	2*	85	NPV = 97.7%
	Sensitivity= 99.5% (95% CI: 98.1% to 99.9%)	Specificity= 7.4% (95% CI: 6% to 9.1%)	
<b>Performance of BIG criteria</b>			
Admit (not BIG1)	423	1089	PPV = 28%
Discharge (BIG 1)	2*	55	NPV = 96.5%
	Sensitivity = 99.5% (95% CI: 98.1% to 99.9%)	Specificity= 4.8% (95% CI: 3.7% to 6.3%)	

Department. The decision rule achieved a sensitivity of 99.5% (95% CI: 98.1% to 99.9%) and specificity of 7.4% (95% CI: 6% to 9.1%) to the primary outcome. The BIG criteria achieved the same sensitivity but lower specificity (5%).

Our empirical models showed good predictive performance and outperformed the BIG criteria. This would potentially allow ED discharge of one in twenty patients currently admitted for observation. However prospective external validation and economic evaluation is required.