Results and critical analysis of the application of the CRASH neurotrauma outcome calculator within the patient cohort 2010-2014 of the Ghent University Hospital

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Background & Aim

- Traumatic Brain Injury (*TBI*) = significant cause of morbidity and mortality among young people
- CRASH calculator predicts mortality and unfavourable outcome after TBI at 14 days (dead) and after 6 months (Glasgow Outcome Scale <4)
- Prognostic variables used in calculator: age, sex, cause of trauma, Glasgow Coma Scale, pupil reactivity, CT-scan findings, polytrauma, high/low income country
- Aim: validate the CRASH calculator by applying to neurotrauma patient cohort 2010-2014 of Ghent University Hospital

Material & Methods

- Retrospective cross-sectional observational study

TBI patients Jan 2010 – Dec 2014
n=959

↓

Patients ≥ 15 years old
n=571

↓

No known history of TBI, no missing data
n=417

- Calculating CRASH score and looking up real life outcome was done seperately by the 2 researchers

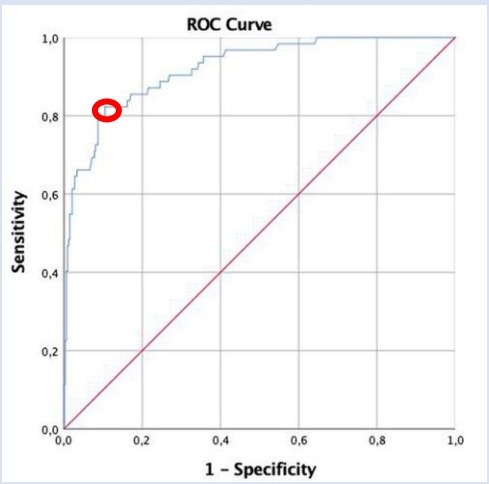
N=417

Researcher 1	*Researcher 2*
Step 1: calculating CRASH score *n=209*	Step 1: calculating CRASH score *n=208*
Step 2: looking up real life outcome in patient files *n=208*	Step 2: looking up real life outcome in patient files *n=209*

- Statistical validation of CRASH calculator using ROC-curve analysis

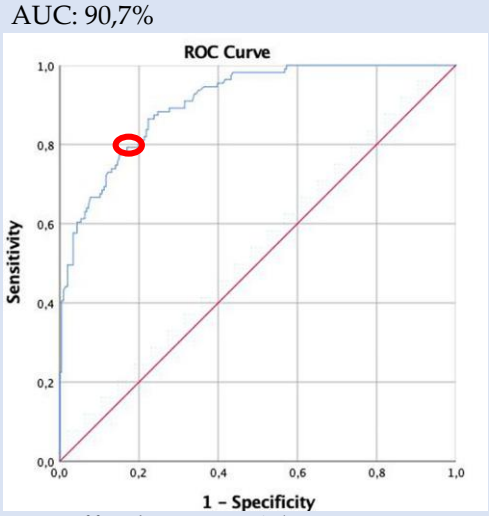
Results

- 14 days after trauma
  mean CRASH score: 18,8%
  patients alive: 80,1%
  Area Under Curve (*AUC*): 92,1%



Cut-off value: 31,5% (sens 0,823; spec 0,895)
NPV 96,5%; PPV 59,3%; RR 16,7

- 6 months after trauma
  mean CRASH score: 41,5%
  patients with GOS <4: 35%
  AUC: 90,7%



Cut-off value: 55,75% (sens 0,793; spec 0,830)
NPV 88,1%; PPV 71,5%, RR 6

Discussion

- No cut-off value had a combined sensitivity and specificity of 100%
- Currently no consensus in literature about validity of CRASH calculator
- Limitations: retrospective study, subjective interpretation of GOS, observer variability in interpreting CT-scans
- Strenghts: inclusion criteria very similar to original CRASH study, data collection performed blindly, heterogenous and large study population

Conclusion & Take Home Messages

- ❑ There is currently no consensus about the validity of the CRASH calculator and similar prognostic tools
- ❑ This study shows that the calculator can be used in clinical practice
- ❑ However, this calculator can **NOT** replace clinical decisicion-making process of physicians
- ❑ Further research is strongly recommended

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