

End of Life Matters in Neurosurgery

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**Government
of South Australia**

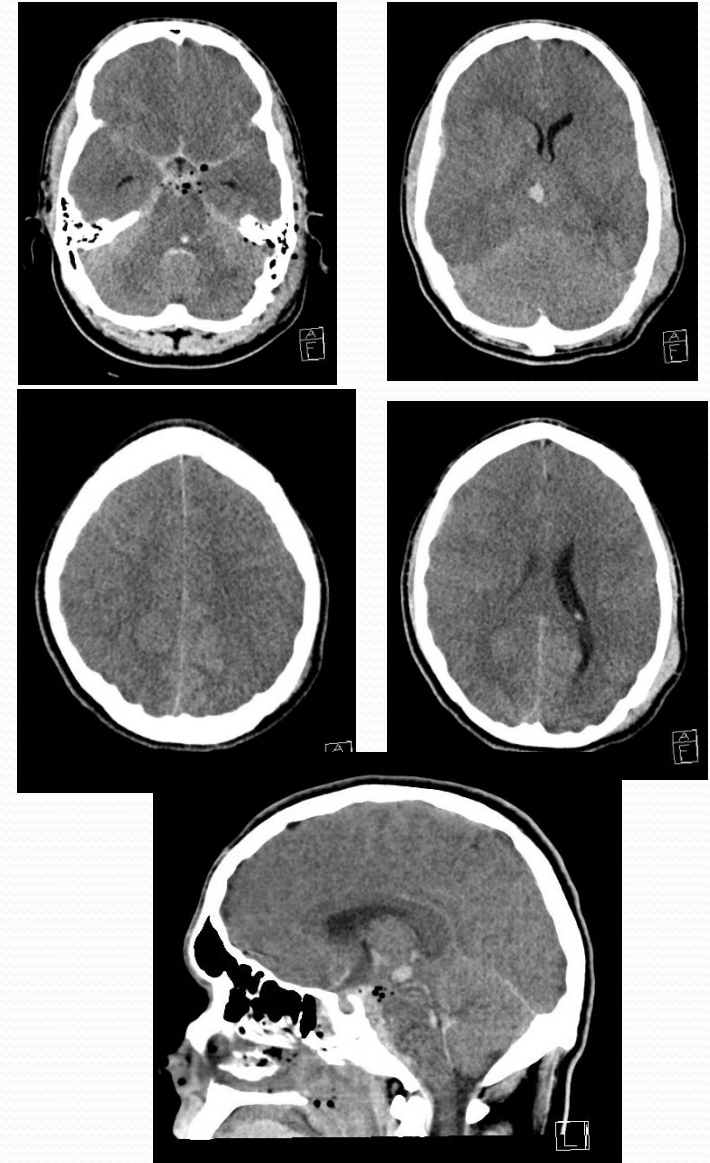
SA Health

Predicting neurological outcome

- Severe head injuries, high grade aneurysmal subarachnoid haemorrhage, malignant MCA stroke...
- Long term neurological outcome and independent survival difficult to predict
- Neurosurgical intervention may reduce the mortality but at the expense of increased numbers of dependent survivors
- Ethical decisions regarding withholding life-preserving treatment

Case study

- Young male
- Industrial accident Difficult airway, MEDSTAR intubation and retrieval to RAH. Hypoxic and hypotensive, short period of CPR
- GCS 3/15 on arrival, pinpoint pupils unreactive
- CT scan on arrival:



Predicting outcome: calculators

- CRASH¹

- 14 day mortality **60.7%** (95% C.I. 46.4-73.3)
- 6 month unfavourable outcome **83.1%** (95% C.I. 73.6-89.7)

- IMPACT²

- 6 month mortality (core + CT + Lab) = **83%**
- 6 month unfavourable outcome = **92%**

Head injury prognosis **CRASH**

These prognostic models may be used as an aid to estimate mortality at 14 days and death and severe disability at six months in patients with traumatic brain injury (TBI). The predictions are based on the average outcome in adult patients with Glasgow coma score (GCS) of 14 or less, within 8 hours of injury, and can only support - not replace - clinical judgment. Although individual names of countries can be selected in the models, the estimates are based on two alternative sets of models (high income countries or low & middle income countries).

Country: Australia

Age, years: ≤40

Glasgow coma score: 3

Pupils react to light: None

Major extra-cranial injury?: No

CT scan available?

Presence of petechial haemorrhages: Yes

Obiteration of the third ventricle or basal cisterns: Yes

Subarachnoid bleeding: Yes

Midline shift: No

Non-evacuated haematoma: No

Prediction

Risk of 14 day mortality (95% CI) 60.7% (46.4 - 73.3)

Risk of unfavourable outcome at 6 months 83.1% (73.6 - 89.7)



Prognostic Results:

Predicted probability of 6 month mortality: Core model: 54%

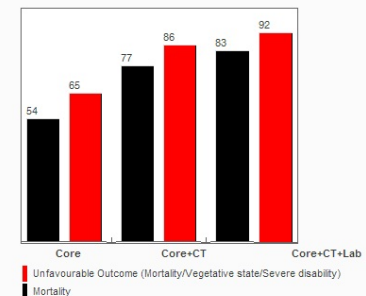
Predicted probability of 6 month unfavourable outcome: Core model: 65%

Predicted probability of 6 month mortality: Core+CT model: 77%

Predicted probability of 6 month unfavourable outcome: Core+CT model: 86%

Predicted probability of 6 month mortality: Core+CT+Lab model: 83%

Predicted probability of 6 month unfavourable outcome: Core+CT+Lab model: 92%



1. <http://www.trialscoordinatingcentre.lshtm.ac.uk/Risk%2ocalculator/index.html>
2. <http://www.tbi-impact.org/?p=impact/calc>

Decompressive craniectomy

- **DECRA (Australia)**
 - Cooper et al., NEJM 2011; 155 patients in 15 centres, 3 countries
 - Early decompressive craniectomy vs best medical management
 - **At 6 months, decompression was associated with higher rates of unfavourable outcome** (70% vs 51%, odds ratio 2.21, 95% C.I. 1.14-4.26, P=0.02)
- **RESCUEicp (UK)**
 - Hutchinson et al., NEJM 2016; 408 patients in 52 centres, 20 countries
 - Decompressive craniectomy vs best medical management
 - **At 6 months, decompression resulted in lower mortality, higher rates of vegetative state and dependence**
- Life saving surgery may not predictably result in good functional survival

Case study

- Decision to proceed to decompressive craniectomy
- Telephone consent with family
- Bifrontal decompression: extremely swollen brain, ICP=80mmHg (normal 5-15)
- Extremely difficult wound closure due to swollen brain

Case study (continued)

- To ICU: persistently elevated ICP
- Discussion with family: non-survivable injury
- Nuclear medicine cerebral perfusion scan following day consistent with radiological brain death
- Organ retrieval same day

Issues

- Uncertainty of predicting neurological outcome following a severe brain insult
- Use of prediction calculators: “the prediction rule can only complement, never replace, clinical judgement...”
- Uncertainty of medical evidence: DECRA, RESCUEicp; better study design?
- Third party consent for life-preserving therapy where the patient cannot participate: good quality of life means different things to different people, the **disability paradox**

Issues: conflicts

- Decisions are frequently guided by:
 - Neurosurgeon knowledge and experience
 - Patient's wishes as described by family
 - **Advanced care directive**
- Conflicts of opinion
 - Medical (should be unbiased)
 - Life preservation vs patient dignity?
 - Family (can be driven by emotion or other reasons)