Revisiting the Futility Debate in Neurocritical Care

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Decompressive craniectomy? Intervene?

At 18 months

- Wheelchair
- Severe contractures
- Transfers with two
- Follows single stage commands
- Self feeds with help
- Incontinent

The Rub
The Rub

Shakespeare - Hamlet’s soliloquy “To be or not to be”:

To die — to sleep.
To sleep — perchance to dream: ay, there’s the rub!
For in that sleep of death what dreams may come
When we have shuffled off this mortal coil,
Must give us pause.

By *rub*, Hamlet means a difficulty, obstacle or objection — in this case to his committing suicide.

- **Risk of Unbearable Badness**

### Medical Futility

**Can it be defined**

<table>
<thead>
<tr>
<th>Physiological (or goal) futility</th>
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<tbody>
<tr>
<td>The intervention cannot possibly have the physiological effect that is desired</td>
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<tr>
<td>- Antibiotics for a viral illness</td>
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<table>
<thead>
<tr>
<th>Contextual futility</th>
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<tbody>
<tr>
<td>The intervention may reverse the pathological change but unsuitable in context</td>
</tr>
<tr>
<td>- CPR in end stage disease</td>
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<table>
<thead>
<tr>
<th>Quantitative futility</th>
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<tbody>
<tr>
<td>Less than 1% chance of achieving restoring the patient to active function</td>
</tr>
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<table>
<thead>
<tr>
<th>Schneidermann</th>
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<tr>
<td>An action or clinical intervention should be deemed futile if it does not achieve the goals of that action.</td>
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<table>
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<tr>
<th>Substantial benefit (Campbell et al. 2005)</th>
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<tbody>
<tr>
<td>An outcome that now or in the future the patient would regard as worthwhile or a state likely to lead to such an outcome</td>
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</table>
Surrogate decision making
What drives the futility debate

Uncertainty
- Risk of an unacceptable outcome
- Possibility of substantive benefit

Consent

21F
(Substance abuse)
Removal of respiratory support

24F
(MVA)
Removal of percutaneous feeding

1990 – 2005. Terri Schiavo,
27F
(Anoxia)
Removal of percutaneous feeding

CAN THIS BE RESOLVED?
Decompressive Craniectomy

Ethical considerations

The tradition framework (Beauchamp and Childress).
- Autonomy
- Beneficence
- Nonmalificence
- Justice

Alternative framework (Jonsen, Siegler and Winslade).
- Medical indications
- Patient preferences
- Contextual features
- Quality of life
Decompressive Craniectomy for Severe Traumatic Brain Injury

Medical indications
Decompressive craniectomy for diffuse traumatic Brain injury

Evidence

Decompressive Craniectomy in Diffuse Traumatic Brain Injury

D. James Cooper, M.D., Jeffrey V. Rosenfeld, M.D., Lynnette Murray, B.App.Sci., Yaseen M. Arabi, M.D., Andrew R. Davies, M.B., B.S., Paul D’Urso, Ph.D., Thomas Kossmann, M.D., Jennie Ponsford, Ph.D., Ian Seppelt, M.B., B.S., Peter Reilly, M.D., and Rory Wolfe, Ph.D., for the DECRA Trial Investigators and the Australian and New Zealand Intensive Care Society Clinical Trials Group*
Decompressive craniectomy

Evidence

ICP > 20mmHg for more than 15 mins in 1 hr despite 1st tier therapy
Decompressive craniectomy

Evidence

Original Primary Outcome: Dependent Outcomes
Unfavorable [GOSE (1-4)]

70% (craniectomy) vs 51% (standard care)
OR = 2.21 (95%CI: 1.14-4.26)  P=0.02

Main Primary Outcome
GOSE-8 (ordinal logistic regression)
median 3 vs 4 (1-8)
OR = 1.84 (95% CI: 1.05-3.24)  P=0.03
• Surgical manipulation of Bifrontal lobe manipulation and decompression
• Complications
• CSF disturbances
• Syndrome of the trephined
• Cranioplasty
14/25-26 despite chemo

91w - I have explained
that ICP's are 25-26mHg despite therapy
that her ICP exceeds maximum medical therapy.

She has opted for medical management

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>07:00</td>
<td>D2 100</td>
</tr>
<tr>
<td>20.8.12</td>
<td>MAP 10</td>
</tr>
<tr>
<td>100</td>
<td>CRI</td>
</tr>
</tbody>
</table>

- This morning ICP 40
- Not responding to simple measures of boluses -
- Paralyse, Na+ 147, Head up 30°
- Thorazine 250 + 250 + 250 + infusion 1.1L/h
- Hyperventilation target pCO2 ~ 30
- For urgent head acen
- N. surgery made aware
Decompressive craniectomy
Surgical Technique / Indications - 2004/2011

- n = 93
- n = 117
- n = 12
### Decompressive Craniectomy
#### Western Australia 2004/12

**Outcome at 6, 12 and 18 months**

<table>
<thead>
<tr>
<th>Status</th>
<th>Good</th>
<th>Moderate</th>
<th>Severe</th>
<th>Vegetative</th>
<th>Dead</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 months</td>
<td>117</td>
<td>64</td>
<td>56</td>
<td>11</td>
<td>18</td>
</tr>
<tr>
<td>12 months</td>
<td>100</td>
<td>68</td>
<td>51</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>18 months</td>
<td>85</td>
<td>51</td>
<td>50</td>
<td>7</td>
<td>45</td>
</tr>
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*n = 270*
MRC Crash Trial
Web based predictive model

Head injury prognosis

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: 8
Pupil react to light: One
Major extra-cranial injury?: Yes
CT scan available?:

Presence of patechial haemorrhages: Yes
Obliteration of the third ventricle or basal cisterns: No
Subarachnoid bleeding: Yes
Midline shift: No
Non-evacuated haematoma: No

Prediction

Risk of 14 day mortality (95% CI) 10.6% (6.1 - 17.9)
Risk of unfavourable outcome at 6 months 53.2% (40.4 - 65.6)
Decompressive craniectomy
Outcome at 18 months - 2004/2012

n = 270
Decompressive craniectomy

Legal, Ethical, Moral and Philosophical issues

• **Legal**

• **Ethical**
  • Surrogates

• **Moral**
  • Descriptive – code of conduct (society, philosophy, religion)
  • Prescriptive - ideal code of conduct espoused in preference to alternatives
    • Murder is immoral

• **Philosophical**
  • Existence, knowledge, truth, beauty, justice, validity, mind, and language.
  • Distinguished by is critical systematic approach and its reliance on reasoned argument
Decompressive Craniectomy for Severe Traumatic Brain Injury

Patient Preferences
Decompressive Craniectomy

Patient Preferences

Informed Consent
- Clear understanding of the facts, implications, and future consequences of an action
- Competent

Surrogate decision makers
- Known wishes
- Substituted judgment
- Best interests

Cerebral Tumour

Severe traumatic brain injury
A fifty-two year old female motorcyclist was involved in a motor vehicle accident. Initial GCS score was recorded as eleven (E3, M6, V2). Pupils were equal and reactive. Major pelvic fractures were noted. Prediction of unfavourable outcome: 72.4%.
Forty two year old 42 Male assault
Initial GCS was recorded as 4 (E1M2V1)
Small unreactive pupils / No other injuries

Prediction of unfavourable outcome: 94.4%
Decompressive Craniectomy for Severe Traumatic Brain Injury

Contextual issues
The powerful human proclivity to rescue a single identified endangered life, regardless of cost or risk.


Estimated total hospital costs including neurosurgical procedural costs per quality-adjusted-life-year (QALY) in US$1000 unit, stratified by the severity of illness in predicted risk of an unfavourable outcome. CI, confidence interval. Predicted risk of an unfavourable outcome. CI, confidence interval.
The Rule of Rescue

**Discussion**

**The rescue morality**

The ethical imperative to save an individual life even when the money and resources might be more efficiently used to prevent deaths in the wider community.

**The Medical Obligation**

To the Family – For the doctor to do everything possible
To the patient – An acceptable outcome

**The Resource Obligation**

Utilitarian allocation of resources
Egalitarian obligation of fairness
Social utility
Decompressive Craniectomy for Severe Traumatic Brain Injury

Quality of Life
Decompressive Craniectomy

Quality of life

What must be acknowledged:
- Longer term improvement
- Adaptation

What remains to be established:
- Patients perceived quality of life
  - Decompressive hemicraniectomy for ischaemic stroke

Those patients that had a severely reduced functional status would not have provided consent for the procedure if they had known their eventual outcome.


Inner world of those that remain severely disabled:
- Minimal consciousness
- Awareness,
- Neural network recovery, Functional imaging
Medical Futility
Revisiting the debate

Decompressive Craniectomy

Medical indications

- Technically straightforward procedure
- Lowers the Intracranial Pressure as a life saving intervention
  - Many patients make a good long term functional recovery
  - Significant number survive but remain severely disabled.

Decompressive Craniectomy Western Australia 2004/9
Outcome at 6, 12 and 18 months

n = 270
Decompressive Craniectomy

Medical indications

CRASH collaborators outcome prediction model

- **Surrogate index of injury severity** (Honeybul et al., 2009 & 2010).

- Probability is not equivalent to certainty.
- Does not justify a conclusion that treatment should cease.
- HISTORICAL DATA.

![Graph showing head injury prognosis with categories for good, moderate, severe, vegetative, and dead outcomes.](image-url)
Decompressive Craniectomy

Patient Preferences

- Personal values
- Autonomy
- Informed Consent
  - Clear understanding of the facts, implications, and future consequences of an action
  - Competent

Forty two year old 42 Male assault
Initial GCS was recorded as 4 (E1M2V1)
Small unreactive pupils / No other injuries

Prediction of unfavourable outcome: 94.4%
Decompressive craniectomy

? Futile ?

03.00 am
18 year old male BIBA
Pushed down stairs by friend at nightclub.
Isolated head injury
Fixed pupil at scene. Second pupil fixed in emergency department

EVD in ICU – 40 mmHg despite maximal medical management

Obliteration of basal cisterns
Non - evacuated haematoma
Midline shift
Petechial haemorrhage
Subarachnoid blood

The Rub
Decompressive Craniectomy

An ethical decision

Whilst we have an obligation to act in what we feel to be the patient’s best interests, feeling is not enough.

Our actions need to be not only reasonable but informed by the evidence.

Any decision to be ethical, must be one that can be included in the narratives of those involved with integrity so that for the person whose life may end and for those who are left grieving there is closure and a sense of having done what is right in a tragic situation.
What is the most difficult ethical dilemma facing science today?

Sir David Attenborough: How far do you go to preserve an individual human life?

Stephen Hawkins: That’s a good one, yes