

End-of-life decisions in patients with severe acute brain injury



Marjolein Geurts, Malcolm R Macleod, Ghislaine J M W van Thiel, Jan van Gijn, L Jaap Kappelle, H Bart van der Worp

Most in-hospital deaths of patients with stroke, traumatic brain injury, or postanoxic encephalopathy after cardiac arrest occur after a decision to withhold or withdraw life-sustaining treatments. Decisions on treatment restrictions in these patients are generally complex and are based only in part on evidence from published work. Prognostic models to be used in this decision-making process should have a strong discriminative power. However, for most causes of acute brain injury, prognostic models are not sufficiently accurate to serve as the sole basis of decisions to limit treatment. These decisions are also complicated because patients often do not have the capacity to communicate their preferences. Additionally, surrogate decision makers might not accurately represent the patient's preferences. Finally, in the acute stage, prediction of how a patient would adapt to a life with major disability is difficult.

Introduction

Most in-hospital deaths of patients with acute stroke, traumatic brain injury, or postanoxic encephalopathy after cardiac arrest follow a decision to withhold or withdraw life-sustaining treatments.¹⁻⁵ These decisions usually evolve from complex discussions that encompass prognosis, physician instinct, patient preferences, and institutional and societal norms and values. Treatment restrictions in patients with severe acute brain injury differ from those in patients in the terminal phase of most other diseases, because continuation of treatment often allows patients to live for months or years, but at the cost of being left in a state of disability that might be against their wishes.^{5,6} In patients with severe acute brain injury, an additional problem in reaching end-of-life decisions is the difficulty in predicting outcome at an early stage. Furthermore, most patients do not have the capacity to make medical decisions and therefore cannot be involved in these discussions themselves, and other informants such as family members might not be able to reliably predict which course the patient would prefer.⁷ Finally, in the acute stage, prediction of how a patient would adapt to a life with major disability is also difficult; patients who have always considered dependency a fate worse than death might change their opinion once they find themselves in that situation.

Although the process of making end-of-life decisions in patients with severe acute brain injury is routine in clinical practice, it has received little attention in the medical published work, especially when compared with similar decisions in patients with a more gradually progressive severe illness. We aim to provide a narrative review of the evidence to guide end-of-life decisions in patients with severe acute brain injury as a consequence of ischaemic stroke, intracerebral haemorrhage, subarachnoid haemorrhage, trauma, or postanoxic encephalopathy after cardiac arrest. We address the judgment of prognosis, the possibilities to respect the patient's autonomy despite incapacity, and the adaptation of patients to life with severe disability. Finally, we suggest how clinicians might better integrate the available evidence and the patient's preferences in the decision-making process.

Definition of end-of-life decisions

We define end-of-life decisions as those related to (1) withdrawal or withholding of potentially life-sustaining treatments, including artificial hydration and nutrition; (2) starting drugs to alleviate symptoms, with hastening of death as a possible or certain side-effect; and (3) euthanasia or physician-assisted suicide.⁸ Euthanasia (ending life on a patient's own insistence) is legal or legally pardoned in only a few countries or states and generally requires the patient to be fully competent.⁹ For this reason, euthanasia is not an option in most patients with acute brain injury and will not be discussed in this Review. Withholding treatment is defined as a decision not to start or increase a life-sustaining intervention. An order not to resuscitate is usually classified as withholding treatment. Withdrawing treatment is defined as an active decision to stop provision of a life-sustaining intervention.¹⁰ Although clinicians are often more comfortable with withholding treatments than withdrawing them, most investigators consider that there is no ethical or legal distinction between the two.^{11,12}

For patients in whom curative treatment is stopped, adequate palliative care to control pain, provide comfort, improve quality of life (QoL), and manage the physical, social, psychological, or spiritual needs of patients and their families is essential.¹³ In patients who are dying, appropriate action should be taken whenever possible to ensure that death is peaceful and dignified.¹⁴ However, a full discussion about the elements of palliative care is beyond the scope of this Review.

Frequency and effect of treatment restrictions

Substantial differences in end-of-life practices have been reported; these can be affected by region, nationality, culture, and religion.¹⁵ In a study of end-of-life practices in intensive care units throughout Europe, treatment restrictions were applied more often in northern than in southern countries, and withdrawal of life-sustaining treatment occurred more often if the physician was Catholic, Protestant, or had no religious affiliation than if he or she was Jewish, Greek Orthodox, or Muslim.¹⁶ A similar association between end-of-life practices and patients' religious affiliations has been reported.¹⁷ Attempts have been made to summarise the views of the largest religions on treatment restrictions and on

Lancet Neurol 2014; 13: 515-24

Published Online

March 25, 2014

[http://dx.doi.org/10.1016/S1474-4422\(14\)70030-4](http://dx.doi.org/10.1016/S1474-4422(14)70030-4)

S1474-4422(14)70030-4

Department of Neurology and Neurosurgery, Brain Center Rudolf Magnus (M Geurts MD, Prof J van Gijn FRCP, Prof L J Kappelle MD, H B van der Worp MD), and Julius Center

(G J M W van Thiel PhD), University Medical Center Utrecht, Utrecht, Netherlands; and Centre for Clinical Brain Sciences, University of Edinburgh, Edinburgh, UK (Prof M R Macleod FRCP)

Correspondence to:

Dr Marjolein Geurts, Department of Neurology and Neurosurgery, University Medical Center Utrecht, PO Box 85500, 3508 Utrecht, Netherlands
m.geurts-2@umcutrecht.nl

euthanasia,¹⁷ but these general views will not necessarily apply to the individual patient. The many smaller and larger denominations within the various religions might have different views on these issues, and views among people of the same religion might differ by place of residence. Additionally, the interpretation of religious teachings can vary from one individual to another.

In US and Canadian studies in patients with ischaemic stroke,⁵ intracerebral haemorrhage,¹ traumatic brain injury,⁴ or coma after cardiac arrest,² 70–97% of early deaths occurred after decisions were made to withdraw or withhold life-sustaining treatments. Because these studies were small and done in academic or tertiary referral centres, whether these data can be extrapolated to a more general population of patients with acute brain injury is unclear.

Since information on the timing and type of treatment restrictions and the reasons for their implementation is limited, the exact effect of treatment restrictions on case fatality in patients with acute brain injury is unknown. For example, withdrawal of care in a 90-year-old patient with a large intracerebral haemorrhage at a stage when he or she is in a deep coma and has two fixed and dilated pupils is unlikely to have a material effect on outcome. By contrast, withholding of care will strongly increase the risk of death in a young patient with a large space-occupying hemispheric infarction who is eligible for a potentially life-saving surgical decompression.¹⁸ A retrospective assessment of patients with ischaemic stroke who died after a decision to withdraw or withhold potentially life-sustaining interventions suggested that 41% of early deaths might have been delayed beyond 30 days if those potentially life-saving measures had been taken.⁵ In a study of patients with intracerebral haemorrhage, the reported prevalence of favourable functional outcome was lower than predicted in patients with “do not attempt resuscitation” orders and higher than predicted in patients who did not have these orders.¹⁹ Based on these data, in the USA alone each year over 7000 patients with intracerebral haemorrhage would lose their chance of a favourable outcome as a result of prognostic pessimism.¹⁹ Despite the limitations surrounding these estimates, treatment restrictions might affect case fatality in a substantial number of patients with acute brain injury.

Medical futility

Decisions to withhold or withdraw life-sustaining treatment are often justified by a claim of medical futility. However, this term is ill-defined and therefore of limited usefulness. For example, treatments have variously been classified as futile if they have less than 1% chance of success, if they would not lead to an acceptable QoL, or if they would not prevent death within weeks or months.²⁰ Treatments might also be perceived as futile if they are unlikely to achieve an effect that the patient would appreciate as a benefit.²¹

Prognostication

Accurate information about the expected outcome of the disease is needed to guide physicians and other professionals, and patients and their relatives in making decisions related to withdrawal or withholding of life-sustaining treatments. Overoptimistic expectations can lead to aggressive management that is not appropriate and leaves patients in severely disabled states that might be against their wishes. Conversely, unfounded pessimism can lead to early withdrawal of treatment and thereby prevent the opportunity for some recovery and adaptation of patients and families to the disability.⁵

Prognostic models

Except in the case of postanoxic encephalopathy after cardiac arrest,²² individual risk prediction based on one factor is usually poor. Recognition of this fact has led to the development of prognostic models based on several factors in combination to predict outcome in individual patients.^{23–26} Systematic reviews on prognostic models are available for intracerebral haemorrhage,^{24,27} subarachnoid haemorrhage,²⁵ and traumatic brain injury.²⁸ Most of these models are limited to use in the first hours or days after brain injury. Table 1 lists examples of such models; an example of a case of traumatic brain injury in which a prediction model was applied is presented in panel 1. Most prediction models in patients with acute brain injury were not developed with the specific aim of informing end-of-life decisions.

Accuracy

Good prognostic models to be used in decisions concerning life or death should have strong discriminative power. More specifically, the false-positive rate of a predicted poor outcome should preferably be 0, with a narrow 95% CI. At present, such models exist only for comatose patients after cardiopulmonary resuscitation for cardiac arrest.²² In these patients, the false-positive rate for poor outcome is 0 (with narrow 95% CIs) for several separate predictors (absent pupillary light response or corneal reflexes after 3 days, extensor or no motor response to pain after 3 days, or bilateral absence of the N20 component of the somatosensory evoked potential on days 1–3). These predictors are based on findings in patients not cooled after cardiac arrest, but whether they also apply to patients treated with hypothermia remains uncertain. Findings from a recent study suggested that in patients treated with hypothermia, absent pupillary light responses or absent corneal reflexes at 72 h, or absent somatosensory evoked potentials after 1 day, are also reliable predictors of poor outcome, although with higher false-positive rates and wider 95% CIs than in patients not treated with hypothermia.⁴⁵ For other causes of acute brain injury, prognostic models are generally not sufficiently accurate to be the exclusive foundation of decisions to limit treatment. This factor is the case even for models developed with data from

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