Should we have a guard against therapeutic nihilism for patients with severe traumatic brain injury?

Many clinicians would agree that a vegetative outcome is a fate worse than death after a severe traumatic brain injury (TBI). In an effort to avoid poor outcomes of this nature, neurotrauma practitioners draw from their training and experience to make the monumental decision of when to recommend against aggressive care in severe TBI patients. Such judgements are, unfortunately and invariably, subjective with an inherent risk of depriving a patient of a reasonable chance of a good outcome. Substantially adding to this complexity is the fact that questions like “What is an acceptable outcome?” and “What is a reasonable chance of an acceptable outcome?” are highly personal and at least as philosophical as they are medical. We have found great variation in practitioner aggressiveness in different regions and even within the same department of a single hospital. Issues surrounding aggressiveness in severe TBI patients and variability in aggressiveness have been the subject of remarkably little study when considering the high frequency and the marked consequences of these decisions. Indeed, we are increasingly certain about what constitutes best care (Thomas et al., 2000; Carney et al., 2017) but we have very little guidance about when it is appropriate or not to apply best care in the most severely injured patients.

As our ability to accurately prognosticate outcome from severe TBI improves it is possible and important to discuss what constitutes therapeutic nihilism in a more objective fashion. The International Mission for Prognosis and Clinical Trial Design in Traumatic Brain Injury (IMPACT) and Corticosteroid Randomization after Significant Head Injury (CRASH) prognostic models have been a major advance in our ability to predict patient outcomes early after TBI (Moore et al., 2013) but we have very little guidance about when it is appropriate or not to apply best care in the most severely injured patients. It was concluded that the predictions of clinical experts constitute therapeutic nihilism for patients with severe traumatic brain injury (Crane et al., 2017; Hulbert et al., 2017). Distinct from this is the notion of therapeutic nihilism. Nihilism is an inappropriately pessimistic view of a patient’s outcome and the ability of a patient to benefit from aggressive care. This can deprive patients of the chance of an outcome that would be acceptable to them and what they judge to be a reasonable chance of attaining that outcome.

An additional scenario problematic in modern medicine is the influence of performance in national hospital rankings. An unintended consequence of these rankings can be a decision to avoid aggressive care in patients with a high chance of a poor outcome which would adversely affect rankings. Public rankings are intended to promote the best care of patients but in this fashion they can have the opposite effect.

Self-fulfilling prophecies: In considering nihilism and level of care decisions following severe TBI, it is critical to consider how the expectation of a poor outcome can become a self-fulfilling prophecy. This fallacy can occur when the prediction of an event becomes reality simply by virtue of having been predicted. Said differently – subjecting a patient to suboptimal care because it is believed they may not benefit from care has the potential to secure a poor outcome even if a good outcome could have been achieved. This idea was capably discussed by Hemphill and White who provided a hypothetical scenario of 100 patients with severe stroke in which 70 die. If the death of 70% of these patients was preceded by withdrawal of support, despite some having the capacity to survive if support was maintained, then the true mortality rate would actually be lower (Hemphill and White, 2009). In severe neurological injuries such as TBI, in order for a patient to achieve a good outcome they must first survive, of course. If support is withdrawn early after injury and the patient dies, it is impossible to determine whether or not this was inevitable. This phenomenon can also cloud our ability to accurately understand the natural history of severe insults. It is, of course, hoped that the self-fulfilling prophecy fallacy will not rob a patient of a reasonable chance of an acceptable outcome. An accurate prediction model and a protocol to protect against nihilism could help to protect patients from therapeutic nihilism secondary to biased or inaccurate outcome predictions.

Physician autonomy and ability to predict outcome from TBI: Subjecting physicians to a guard against nihilism would likely bring about objections for a variety of reasons, not the least of which is the fact that it would infringe upon the autonomy of highly trained, skilled and experienced care providers. An important consideration in this issue, however, is that evidence to date suggests that physicians are unable to prognosticate accurately following TBI and that their judgements tend to be excessively pessimistic. Moore et al. (2013) found evidence for variation and systemic bias in clinicians’ perceptions of prognosis following brain injury. It was concluded that the predictions of clinical experts following traumatic brain injury are widely variable and systemically pessimistic compared to the IMPACT prognostic model, which uses objective data such as patient age, motor
A study by Kaufmann et al. (1992) also explored the ability of practitioners to accurately predict patient outcome. In this study, a neurosurgeon and a neuroradiologist examined 100 consecutive severely head-injured patients from the surgical intensive care unit and made outcome predictions. The predictions were made according to a contracted Glasgow outcome scale and were always made by the same experienced neurosurgeon and neuroradiologist. It was found that correct ‘first-day’ prognostic predictions were made in only 59% and 56% of cases by the neuroradiologist and neurosurgeon, respectively (Kaufmann et al., 1992). Additionally, the neurosurgeon consistently overestimated unfavorable outcomes. Interestingly, when the prognoses made by the neuroradiologist and neurosurgeon coincided, the accuracy of the prognoses increased from 56–59% to 73%. Nonetheless, even when both the clinical and radiologic prognosis predictions agreed, nearly 30% of initial prognoses were still incorrect.

In another study, Turgon et al. (2013) sought to understand the attitudes of physicians caring for patients with severe TBI with respect to prognostication and clinical decision making. In a case-based scenario, a third of respondents to the study agreed, a third were neutral, and a third disagreed that patient prognosis would be unfavorable at one year (Turgon et al., 2013). Additionally, only 10% were comfortable recommending withdrawal of life-sustaining therapy. This study further supports the notion that physician opinions regarding aggressiveness of care widely vary and are often pessimistic.

Making prognostic calculations more convenient: An impediment to the use of prognostic calculators, especially in the acute setting, can be the valuable time needed to gather the required data and enter it into an online calculator. Thus, our group worked to implement the IMPACT TBI prognostic calculator into the Epic® electronic health record (EHR) with the goal of creating a tool that could be completed more quickly and efficiently than the current online platform. The integration of the IMPACT TBI prognostic calculator within the EHR was done to account for clinician requests and with regard to both clinical decision support (CDS) ideals and existing EHR, EpicCare® (Epic Systems Corp., Verona, WI, USA) capabilities (Figure 1). The integrated calculator incorporates a sidebar report within the EHR which automatically collates information including blood pressure, pulse oxygen saturation.

In this work, the IMPACT TBI prognostic calculator was implemented directly into EpicCare® using a custom SmartForm, which allows for clinicians to complete the calculations at their preferred time within the workflow. Additionally, the sidebar report panel on the right side collates key patient data needed for the calculation including blood pressure, SpO₂, motor score, pupil reactivity, hemoglobin and glucose level. The results of the calculation are placed into the patient note. This process allows for faster, more efficient calculations and documentation. IMPACT: International Mission for Prognosis and Clinical Trial Design in Traumatic Brain Injury; TBI: traumatic brain injury; SpO₂: pulse oxygen saturation.

Figure 1 Implementation of the IMPACT TBI prognostic calculator into an electronic health record (EHR).
Additional work needed to develop a guard against inappropriate nihilism: We believe that a number of additional steps will be required before a guard against nihilism can be adopted into the clinical care of brain injured patients. In our initial publication we chose to assess thresholds for non-aggressive care based on a perfectly accurate prognostic calculator (Letsinger et al., 2017). We felt it was important to characterize the ideal scenario before introducing the added complexity of an imperfect prognostic model. A survey determining how imperfect prognostic calculations influence thresholds for non-aggressive care should be completed. It must also be considered that physician self-report likely differs from real-world behavior. We have thus initiated a study which will compare provider opinions on aggressiveness to their actual behavior. It will be important for physicians, ethicists and the public to debate the pros and cons of a nihilism guard – this may involve qualitative research strategies. Ultimately a clinical protocol will need to be proposed and tested. We suggest a model whereby an alert is generated by an EHR when an attempt is made to enter palliative care orders on a patient calculated to have an acceptable prognosis.

Conclusion: Prognostic models cannot replace the judgement of physicians. Recently developed and reasonably accurate prognostic models can help to more objectively define nihilism and to protect TBI patients from it, however. These models can also help to reduce variation in the aggressiveness of physicians caring for severe TBI patients. While physicians may object to a reduction in their autonomy, literature to date consistently demonstrates that predictions made by clinicians are inaccurate. This mandates the development of tools to assist with care limiting decisions. Here we propose a guard against therapeutic nihilism which, with further study, could ultimately protect TBI patients from it, however. These models can also help to reduce variation in the aggressiveness of physicians caring for severe TBI patients, while physicians may object to a reduction in their autonomy, literature to date consistently demonstrates that predictions made by clinicians are inaccurate. This mandates the development of tools to assist with care limiting decisions. Here we propose a guard against therapeutic nihilism which, with further study, could ultimately protect patients from practitioners with excessively nihilistic views.

**References**

Carney N, Totten AM, O’Reilly C, Ulman JS, Hawryluk GW, Bell MJ, Bratton SL, Chesnut R, Harris OA, Kissoon N, Rubiano AM, Shutter L, Tasker RC, Vavilala MS, Wilberger J, Wright DW, Ghajar J (2017) Guidelines for the management of severe traumatic brain injury, fourth edition. Neurosurgery 86:e1–15.

Hemphill JC 3rd, White DB (2009) Clinical nihilism in neuroemergencies. Emerg Med Clin North Am 27:27-37, vii-viii.

Kauffmann MA, Buchmann B, Scheidegger D, Gratzl O, Rüdi EW (1992) Severe head injury: should expected outcome influence resuscitation and first-day decisions? Resuscitation 23:199-206.

Letsinger J, Rommel C, Hirschi R, Nirula R, Hawryluk G (2017) The aggressiveness of neurotrauma practitioners and the influence of the IMPACT prognostic calculator. PLoS One 12:e0183552.

Moore NA, Brennan PM, Baillie JK (2013) Wide variation and systematic bias in expert clinicians’ perceptions of prognosis following brain injury. Br J Neurosurg 27:340-343.

MRC CRASH Trial Collaborators, Perel P, Arango M, Clayton T, Edwards P, Komolafe E, Pocock S, Roberts I, Shakur H, Steyerberg E, Yutkhakasemunt S (2008) Predicting outcome after traumatic brain injury: practical prognostic models based on large cohort of international patients. BMJ 336:425-429.

Randolph AG, Zollo MB, Egger MJ, Guyatt GH, Nelson RM, Stidham GL (1999) Variability in physician opinion on limiting pediatric life support. Pediatrics 103:446.

Steyerberg EW, Mushkudiani N, Perel P, Butcher I, Lu J, McHugh GS, Murray GD, Marmarou A, Roberts I, Habbema JD, Maas AI (2008) Predicting outcome after traumatic brain injury: development and international validation of prognostic scores based on admission characteristics. PLoS Med 5:e165; discussion e165.

Thomas L, Cullum N, McColl E, Rousseau N, Sourier J, Steen N (2000) Guidelines in professions allied to medicine. Cochrane Database Syst Rev:CD000349.

Turgeon AF, Lauer J, Burns KE, Meade MO, Scales DC, Zarychanski R, Moore L, Zygyn DA, McIntyre LA, Kanji S, Hébert PC, Murat V, Pagliarello G, Ferguson DA; Canadian Critical Care Trials Group (2013) Determination of neurologic prognosis and clinical decision making in adult patients with severe traumatic brain injury: a survey of Canadian intensivists, neurosurgeons, and neurologists. Crit Care Med 41:1086-1093.

**Correspondence to:** Gregory W. J. Hawryluk, M.D., Ph.D., FRCSC, gregory.hawryluk@hsc.utah.edu.

doi: 10.4103/1673-5374.219037.

**How to cite this article:** Hirschi R, Rommel C, Hawryluk GWJ (2017) Should we have a guard against therapeutic nihilism for patients with severe traumatic brain injury. Neural Regen Res 12(11):1801-1803.

**Peer review:** Externally peer reviewed.

**Open access statement:** This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under identical terms.

**Open peer review report:**

Reviewer: Creed Stary, Stanford University School of Medicine, USA.

Comments to authors: The authors review the challenges of end-of-life decision making in patients with severe TBI and low probability of meaningful recovery. They highlight the risk of “therapeutic nihilism,” defined as “an inappropriately pessimistic view of a patient’s outcome and the ability of a patient to benefit from aggressive care,” and the risk that decision making within this context can be fall patients who would benefit from aggressive therapy. The Authors present prior work outlining algorithmic software available for the electronic medical record to help physicians avoid this pitfall and aid decision-making.