

**Canadian Critical Care Society (CCCS) / Canadian Association of Emergency Physicians (CAEP) /  
Canadian Neurocritical Care Society (CNCS)**

**Joint Position Statement**

**Management of Devastating Brain Injuries in the Emergency Department:  
Enhancing Neuroprognostication and Maintaining the Opportunity for Organ and Tissue Donation**

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### **Summary:**

The primary purpose of this statement is to improve neuroprognostication after devastating brain injury, with a secondary benefit of potential organ and tissue donation.

### **In Scope:**

Adult patients with devastating brain injury who have had initiation of resuscitation measures, including intubation and mechanical ventilation.

### **Out of Scope:**

Clinical decision-making regarding initiation of resuscitation measures after devastating brain injury.

### **Introduction**

Devastating brain injury (DBI) is defined as a neurological injury (trauma, subarachnoid hemorrhage, stroke, hypoxic injury, etc.) that is assessed as an immediate threat to life or incompatible with good functional recovery and where early limitation or withdrawal of therapy is being considered.<sup>1,2</sup> The outcomes for patients who present in the ED with DBI are often death or, in some cases, survival with extremely limited capacity. Consequently, many physicians consider admission to the intensive care unit (ICU) inappropriate as it is not only futile and challenging in the face of scarce ICU resources but also a burden on patients and families by offering prolongation of what may be an inevitably a poor outcome.

However, the management of DBI in the emergency department (ED) is evolving. Accurate prognostication in the early stages of DBI cases can be difficult, and rigorous, evidence-based prognostication strategies in patients with DBI are limited. Clinician variability in the withdrawal of life-

sustaining treatments impacts on patient outcomes. A recent multicenter retrospective cohort study of patients with severe DBI in Canadian level-one trauma centers identified significant variation in mortality across centers. Mortality rates were significantly impacted by varying approaches to withdrawal of life-sustaining measures (WLSM), highlighting deficiencies of early prognostic strategies in trauma.<sup>3</sup> In-hospital mortality after intracerebral hemorrhage is significantly influenced by the variability in the rate at which treating hospitals use DNR orders, even after adjusting for case mix.<sup>4</sup> To improve the quality of decision making to better inform whether the patient can survive and recover, transfer to the ICU for a period of physiological support and observation is recommended.<sup>1,2</sup>

The optimal period for observation to establish greater confidence and accuracy in prognostication following DBI is not well established. The Neurocritical Care Society<sup>1</sup> recommends a 72-hour observation period, during which physiological support can prevent unwarranted deterioration and allow sufficient opportunity for prognostic evaluation, care planning, and a more definitive determination of prognosis based on repeated examinations over time. The United Kingdom (Faculty of Intensive Care Medicine, Intensive Care Society, Neuroanaesthesia and Critical Care Society, Royal College of Emergency Medicine, Society of British Neurological Surgeons) recommends the length of the observation period be based on a combination of clinical judgement, changes in neurological function, the degree of support required to maintain physiological stability, and communication with the patient's family to determine patient preferences.<sup>2</sup>

Though death may be the most likely outcome in many of these cases, a period of observation will further ensure the accuracy of this prognosis and avoid what may be an inappropriate limitation in care.<sup>5</sup> The primary aim is to improve the ability to distinguish patients who may have the capacity to recover and survive. In addition, it allows for timely referral to the provincial organ donation organization, ensuring patients and their families are given sufficient opportunity to consider organ and tissue donation. A recent systematic review<sup>6</sup> of emergency department deaths revealed a substantial proportion (46.2-84%) of potential organ donors were missed due to a failure to refer for consideration of organ donation, in part due to incorrect assumptions regarding eligibility criteria and failure of the healthcare team to refer for consideration of donation. In Ontario, over the 2017/18 – 2018/19 fiscal years, 33 of 178 (19%) patients who died in the ED and were not referred to the organ donation organization had organ donation potential (unpublished data, Trillium Gift of Life Network 2019).

A potential organ donor is someone who has a very high chance of death but in whom active care continues or suitability for donation has not yet been established. In those cases where continued physiological support will have no benefit for prognostication or neurological outcome, physicians should refer patients to their provincial organ donation organization prior to WLSM. In accordance with the Potential Organ Donor Identification and System Accountability guideline,<sup>7</sup> patients who meet the following criteria should be considered potential organ donors and referred to the organ donation organization:

1. Ventilated (invasive or non-invasive);
2. Condition with a grave prognosis in which death is imminent;
3. Consideration of withdrawal of life-sustaining measures.

## Position Statement

To ensure that the management of DBI includes an observation period for optimized neuro-prognostication, and families are given the opportunity to consider organ donation as part of quality end of life care, the following high-level concepts are supported:

1. Early prognostication in devastating brain injury has known limitations and can be inaccurate. A sufficient period of observation and physiologic support increases the opportunity for patient survival/recovery.
2. Withdrawal of life sustaining measures in DBI cases should be decided after observation of clinical evolution in an ICU setting in order to optimize patient outcomes. Exceptions to this would include, but are not limited to cases where:
  - It is clearly outlined that ongoing care is not consistent with the patient's previously expressed wishes (either documented or supported by available substitute decision maker)
  - Physiologic futility- inability to maintain cardio-respiratory stability function due to extent of injuries or illness severity
  - Concurrent comorbidities that are considered inappropriate for ICU admission in the absence of a DBI
3. Although a critical care setting with neurosurgical capacity is preferred when indicated and feasible, for patients without surgical indications these aims could be achieved in any critical care environment.
4. Where patient survival/recovery is not possible, it provides an important opportunity to consider organ donation.
5. Identification and timely referral of potential organ donors in the ED as part of end of life care can save and enhance lives through organ and tissue donation.
6. Physiological support should be maintained until:
  - the patient receives an appropriate period of observation for neuro-prognostication based on clinical circumstances; AND
  - a decision for WLSM has been made or the patient meets neurological criteria for death determination; AND
  - the patient has been referred to the organ donation organization; AND
  - a donation conversation has been facilitated, where appropriate.
7. This strategy has the potential to increase the number of survivors from DBI and fulfills the opportunity to save lives through organ and tissue donation.

## References

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