

Banner University Medical Center Tucson

Devastating Brain Injury Guidelines

- I. **PURPOSE:** To provide standard, critical care to patients with devastating brain injuries in order to optimize the perfusion and function of all organ systems, such that the possibility for survival for those who are deemed non-survivable as well as the option for organ donation can be simultaneously preserved. Devastating brain injuries are those that are deemed to not have a reasonable chance of survival by the Neurosurgery and/or Trauma services.

II. GOALS

**** Prioritize early family discussion for goals of care****

-While awaiting family to arrive to the hospital for a “goals of care” discussion, proceed with the following:

A. Normalize hemodynamic status (Note: patients with pre-existing hypertension may require a higher MAP to maintain organ perfusion/function.)

1. Maintenance IV: NS with 20mEq KCl at 125cc/hour (may need to adjust saline concentration for serum Na+ < 135 or > 155); consider hypotonic fluids for patient with severe DI. Titrate rate for patients at risk for fluid overload.
2. For MAP < 65: Normal Saline 500cc bolus (evaluate for the need to support with vasopressors)
3. For Hgb < 7, consider one unit packed cells. Repeat as necessary.
4. For MAP < 65 with unsustained response to fluid resuscitation: Utilize infusions of norepinephrine or vasopressin (preferred if Diabetes Insipidus is also present)
5. Normalize serum lactate
6. If an intracranial pressure monitoring device is present, maintain the cerebral perfusion pressure (CPP) above 60 through optimization of MAP and ICP

B. Normalize Oxygenation/ventilation

1. Adjust FiO₂ to maintain O₂ saturation > 92%
2. Adjust tidal volume to 6-8cc/kg of ideal body weight
3. Adjust respiratory rate to maintain a normal pCO₂
4. Use physiologic PEEP (5cm) – Consider higher levels to treat atelectasis or if FiO₂ > 60%
5. Pulmonary toilet/suction q 1-2 hrs
6. Follow chest x-rays PRN and treat as indicated
7. Avoid fluid overload

C. Normalize Coagulation System

1. Maintain normothermia with warming blanket to achieve core temperature of 36-37 C

2. Maintain normal acid/base balance with:
 - a. Volume replacement
 - b. Ventilator setting adjustments
 - c. Administration of buffers
3. Obtain thromboelastography every 4 hours and correct coagulopathy accordingly.

D. Treat Neuro-Endocrine disturbances

1. Diabetes Insipidus

- a. For urine output > 300cc/hr x 2hrs **and** urine specific gravity is < 1.005 and serum Na >145, give either:
 - i. DDAVP .5-1 mcg IV. May repeat PRN Q2 hours for inadequate response
 - i. Differentiate DI (high UOP, low serum osom, low urine osom) from osmotic diuresis (urine osmolarity >200)
 - ii. Vasopressin 1 u IV bolus followed by continuous infusion of 25 u/250 mL D5W starting at 0.5 u/hr and titrated up to 4 u/hr continuous IV gtt @ 0.04 units/min
- b. Monitor/treat related electrolyte disturbances (especially Na⁺, K⁺, Mg⁺⁺, and Ca⁺⁺)

2. Impaired Glucose Tolerance – For glucose >180 mg/dL, institute hospital Insulin Therapy Protocol

3. **Thyroid hormone insufficiency** – If death according to neurologic criteria is imminent/suspected and there is a persistent requirement for high-dose vasopressors (equivalent to > 0.15 mcg/kg/min of norepinephrine), despite volume resuscitation and correction, consider:
 - i. Levothyroxine 20 mcg IV bolus over 3 minutes (only if serum K⁺ > 3.5) followed by...
 - ii. Levothyroxine infusion (200 mcg in 500 ml 0.9% NS) – to stimulate cellular metabolism donor management– begin at 10 mcg/hr and Titrate to maintain an SBP above 100 mm Hg or MAP greater than 65mm Hg to a maximum of 50 ml/hr (20 micrograms/hr)

4. **Adrenal insufficiency** – Consider for hypotension refractory to fluid resuscitation and vasopressors. Hydrocortisone 50mg IV q6 hours or 100mg IV q 8 hours

E. Normalize blood chemistry/components – Monitor and treat q6 hours: electrolytes, BUN/Cr, glucose, CBC, TEG, ABG, lactate, and any labs noted to be deranged.

F. Support GI Integrity/Nutritional status – Consider enteral tube feeding if hospitalized > 24-48 hrs.

G. Treat infection