

**HOSPITAL PROTOCOL**  
Collaborative Practice Council

**Title :** Pentobarbital Coma Protocol

**Code:** CPC-2005JUL-2.P.20

**Title of Responsible Party:** Executive Director, Critical Care Services

**Origination Date:** 2/2000

**Effective Date:** 7/2005

**Review/Revision Dates:** 5/2002, 7/2005

**Scope:** Physicians, Nurses, Pharmacists, and Respiratory Therapists

**Key Words:** @Pentobarb, @EEG, @neurotrauma, @ICP

**General Description:** High dose barbiturate therapy lowers ICP and decrease the cerebral metabolic usage of oxygen by altering vascular tone, suppressing metabolism, inhibiting free radical mediated lipid peroxidation, and coupling cerebral blood flow to regional metabolic demands. This has a beneficial effect on ICP and global cerebral perfusion.

**Purpose:** High dose barbiturate therapy is used in patients with severe brain injury when intracranial hypertension is refractory to maximal medical and surgical intracranial pressure (ICP) lowering therapy.

**Patient Population Involved:** Severe brain injured patients with increased ICP refractory to maximal medical and surgical therapy: Adult and children  $\geq 8$  years of age. Patients in status epilepticus or recurrent seizures uncontrollable with standard anticonvulsant therapy: Adults age  $\geq 18$  years

**Protocol:**

- 1 The neurosurgeon/neurologist will assess patients for appropriateness of treatment. Patients sustaining the following are candidates for pentobarbital coma:
  - 1.1 Traumatic brain injury with increased ICP not controlled with maximal medical and surgical interventions: Age  $\geq 8$  years
  - 1.2 Intracerebral hemorrhage including Subarachnoid hemorrhage: Age  $\geq 18$  years
  - 1.3 Status epilepticus: Age  $\geq 18$  years

- 2 Upon receipt of the physician order to administer pentobarbital for induced coma, assure the patient has the following supportive equipment:
  - 2.1 Mechanical ventilator and pulse oximeter/End tidal CO<sub>2</sub> monitor
  - 2.2 Cardiac monitor
  - 2.3 Pulmonary artery catheter for monitoring hemodynamics including preload, afterload, and contractility or \*CVP catheter in pediatric patients
  - 2.4 Arterial catheter for invasive BP monitoring
  - 2.5 Vascular access (large bore lines) sufficient to allow fluid and medication administration
  - 2.6 Bedside EEG monitor capable of monitoring burst suppression and/or Bispectral Index Monitor (BIS)
  - 2.7 TED hose and sequential compression device - thigh high
  - 2.8 LICOX brain tissue oxygen monitor/Jugular venous oxygen saturation monitor\*
  - 2.9 ICP monitor\*
  - Note: \*These items may not be needed in certain patients and are at the discretion of the physician.
  
- 3 Assess the patient's clinical status. Prior to initiating barbiturate therapy
  - 3.1 Assure ventilatory status is secured by mechanical ventilation. Maintain SaO<sub>2</sub> > 95% and titrate PaCO<sub>2</sub> for ICP control using PbtO<sub>2</sub>/SjO<sub>2</sub> as a guide.
  - 3.2 Assure patient is normovolemic. Maintain PCWP > 8-12 mm Hg titrate with 5% albumin or NS in adults and 5-10cc/kg in children per physician order
  - 3.3 Assure Cerebral Perfusion Pressure (CPP) is > 70 mm Hg. Administer volume as stated above and then begin vasopressors to achieve adequate Mean Arterial Pressure (MAP) per physician order.
  - 3.4 Assure TED hose/sequential compression device are in place
  - 3.5 Assess ICP and LICOX/SjO<sub>2</sub> if in place and document.
  - 3.6 Attach EEG bedside monitor.
  
- 4 Dosage of Pentobarbital per physician order to induce coma:
  - 4.1 Loading dose: 10 mg/kg of pentobarbital sodium over 30 minutes IV followed by 5 mg/kg/hour x 3 hours IV
  - 4.2 1 – 3 mg/kg/hour continuously titrated for burst suppression of 10-12 seconds (5-6 lines) on continuous EEG or achievement of a score between 10-20 on the BIS (Bispectral Index Monitor) and concurrent SR (suppression ratio) score >60%
  - 4.3 **Adults Only:** If patient is on high dose Propofol at time of induction of barbiturate therapy, the physician may elect to titrate the dosage of pentobarbital as follows:
    - 4.3.1 Give a 100 mg bolus of pentobarbital
    - 4.3.2 Begin a continuous dose of 50 mg/hour while maintaining propofol.
    - 4.3.3 Slowly reduce propofol at a rate of 10 ug/kg/min every 20 minutes. Once propofol is discontinued, increase dosage of pentobarbital to 1-3 mg/kg/hour until burst suppression of 10-12 seconds is achieved on EEG monitor or achievement of a score between 10-20 on the BIS (Bispectral Index Monitor) and concurrent SR (suppression ratio) score >60%. If burst suppression is not achieved, contact the physician for further orders.

- 5 Assess patient closely while on Pentobarbital therapy. It is recommended these patients be staffed 1:1.
  - 5.1 Monitor Neuro status. Pupils may vary in size and non-reactive. Blink reflex and cough reflex will diminish
  - 5.2 Provide eye care with drops and patches as needed to protect eyes from drying.
  - 5.3 Monitor ICP and LICOX/SjO2 responses to therapy.
  - 5.4 Monitor EEG for burst suppression. Goal is 10-12 seconds (5-6 lines on EEG) of burst suppression as seen on EEG. Monitor BIS monitor for score between 10-20.
  - 5.5 Monitor blood levels for pentobarbital as ordered.
  - 5.6 Monitor respiratory status. Due to diminished cough reflex, patient is at great risk for pulmonary sequelae.
    - 5.6.1 Monitor ventilator settings, SaO2, PaO2, and PaCO2/ETCO2.
    - 5.6.2 Turn patient at least every 1-2 hours and as needed
    - 5.6.3 Suction patients as indicated
  - 5.7 Monitor hemodynamic status
    - 5.7.1 Monitor MAP, Cardiac output/index, PA pressures, PCWP, CVP, SVR, Stroke Volume, and LVSWI/RVSWI.
    - 5.7.2 Maintain PCWP > 8-12 mm Hg as per physician orders
    - 5.7.3 Administer vasopressors to maintain an adequate CPP (or MAP > 90 mm Hg if no ICP) as per physician orders. Neosynephrine, Dopamine, or Levophed may be used to enhance MAP per order.
  - 5.8 Monitor serum electrolytes q 24 hours or as needed per physician order.
  - 5.9 Assure system support is instituted
    - 5.9.1 NG to low continuous suction
    - 5.9.2 Enteral feedings should be post-pyloric feeding due to delayed gastric emptying
    - 5.9.3 Parenteral nutrition if patient does not tolerate enteral feedings.
    - 5.9.4 Maintain normothermia 97-98.6 degrees F. (Barb therapy causes poikilothermia)
    - 5.9.5 TED hose/sequential compression device to reduce risk of DVT
    - 5.9.6 Skin assessment and care prn
    - 5.9.7 Range of motion to extremities as tolerated
  
- 6 Upon physician order to discontinue coma, titrate pentobarbital to slowly withdraw drug. Decrease by 0.5 mg/kg/hr increments every 6 hours (unless physician orders otherwise) while monitoring effects on ICP, SjO2, and MAP.

**Committee Review:** Trauma M & M, ICU Committee, Pharmacy & Therapeutics, Children's Critical Care, Collaborative Practice Council

**References:**

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