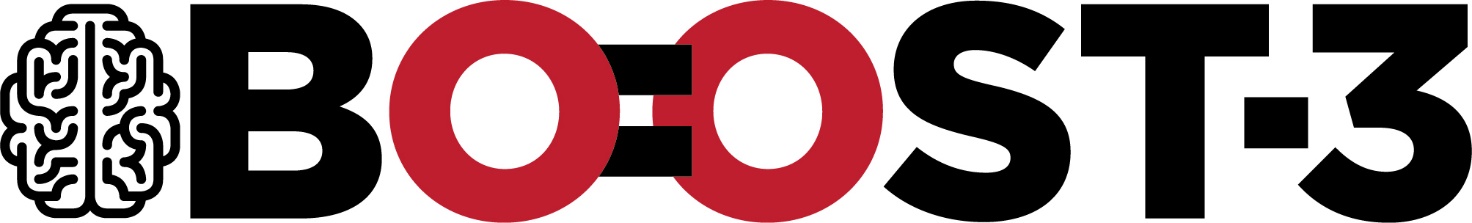
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| Scenario B: Isolated ICP increase | Scenario C: Isolated PbtO2 drop | Scenario D: ICP Increase + PbtO2 drop |
| TIER 1: must begin within 15 minutes of abnormality   * Adjust head of the bed to lower ICP * Ensure Temperature < 38°C. * Titrate pharmacologic analgesia or sedation to effect * CSF drainage (if EVD available) * Optimize CPP to a max 70 mmHg with fluid boluses or vasopressors as clinically appropriate * Low dose Mannitol (0.25 – 0.5 g/kg) * Hypertonic saline; (may include 1.5% to 3% HTS). This tier does not include 7.5% or higher concentrations of HTS. Titrate to effect (ICP control) and maintain sNa < 160 mEq/L. * Initiate or titrate anti-seizure medications (AEDs)\* * Adjust ventilator for a target PaCO2 of 35 - 40 mm Hg and target pH of 7.35 - 7.45 | **TIER 1: must begin within 15 minutes of abnormality**   * Adjust head of the bed to improve brain oxygen level. * Ensure Temperature < 38o C. * Optimize hemodynamics, if clinically appropriate:   + Resuscitation: Address hypovolemia   + Diuresis: Avoid hypervolemia, consider furosemide or other agent for diuresis * Optimize CPP to a max 70 mmHg with fluid boluses or vasopressors as clinically appropriate * PaO2 Adjustments: **Obtain ABG first\***   + Increase FiO2: Increase PaO2 by increasing FiO2 to a **maximum of 60%.**   + Adjust PEEP: Adjust PEEP by a maximum of 5 cm H20 over baseline. Monitor for any ICP response to this change.   + Pulmonary toilet: including suctioning of secretions if secretions are problematic. Bronchoscopy is not included in this tier as an option. * Adjust ventilatory rate to achieve a PaCO2 of 38 - 42 mm Hg while maintaining a target pH of 7.35 - 7.45. * Initiate or titrate anti-seizure medications (AEDs). | **TIER 1: must begin within 15 minutes of abnormality**   * Adjust head of the bed to lower ICP * Ensure Temperature < 38o C. * Adjust pharmacological analgesia or sedation to effect * CSF drainage (if EVD available). * Optimize hemodynamics, if clinically appropriate: * Resuscitation: Address hypovolemia * Diuresis: Avoid hypervolemia, consider furosemide or other agent * Optimize CPP to a max 70 mmHg with fluid boluses or vasopressors as clinically appropriate * Low dose Mannitol (0.25 – 0.5 g/kg) * Hypertonic saline; (may include 1.5% to 3% HTS). This tier does not include 7.5% or higher concentrations of HTS. Titrate to effect (ICP control) and maintain sNa < 160 mEq/L. Adjust ventilatory rate to achieve a PaCO2 of 38 - 42 while maintaining a target pH of 7.35 – 7.45. * Initiate or titrate anti-seizure medications (AEDs). * PaO2 Adjustments: **Obtain ABG first** \* * Increase FiO2: Increase PaO2 by increasing FiO2 to a maximum of 60%. * Adjust PEEP: Adjust PEEP by a maximum of 5 cm H20 over baseline. Monitor for any ICP response to this change. * Pulmonary toilet: including suctioning of secretions if secretions are problematic. Bronchoscopy is not included in this tier as an option. |
| TIER 2: initiate within 60 minutes if Tier 1 therapies are ineffective   * Optimize CPP: May increase CPP above 70 mm Hg with fluid boluses or vasopressors. * Adjust ventilatory rate for target PaCO2 of 33 – 38 mm Hg and target pH of 7.35-7.45 * High dose Mannitol (1-1.5 g/kg) or higher frequency of standard dose mannitol (0.25-0.5g/kg) * Hypertonic saline bolus (i.e., 30 ml of 23.4%). * Repeat CT; treat surgically remediable lesions according to guidelines * Adjust temperature to 35 – 36°C, using active cooling measures. * Neuromuscular blockade with short acting agents, use a bolus dose to determine effect\* | **TIER 2: initiate within 60 minutes if Tier 1 therapies are ineffective**   * Adjust ventilatory rate to increase PaCO2 to 40 – 45 mm Hg while maintaining a pH of 7.35 - 7.45.\* * PaO2 Adjustments: **Obtain ABG first** \*   + Increase FiO2: Increase PaO2 by increasing FiO2 to a maximum of 100%. \*   + Adjust PEEP: Adjust PEEP in increments of 3 - 5 cm H20. Monitor for any ICP response to this change.   + Perform bronchoscopy * Optimize CPP: May increase CPP above 70 mm Hg with fluid boluses or vasopressors. \* * Neuromuscular blockade (NMB) with short acting agents * Transfusion of pRBCs. * Decrease ICP to < 15 mm Hg. * CSF drainage. * Increased sedation | **TIER 2: initiate within 60 minutes if Tier 1 therapies are ineffective**   * High dose Mannitol (1-1.5 g/kg) or higher frequency of standard dose mannitol (0.25-0.5g/kg) * Hypertonic saline bolus (i.e., 30 ml of 23.4%). * Optimize CPP: May increase CPP above 70 mm Hg with fluid boluses or vasopressors. * Transfusion of pRBCs. * Repeat CT; treat surgically remediable lesions according to guidelines * Adjust temperature to 35 – 36°C, using active cooling measures. * Neuromuscular blockade with short acting agents, use a bolus dose to determine effect * PaO2 Adjustments: **Obtain ABG first \*** * Increase FiO2: Increase PaO2 by increasing FiO2 to a maximum of 100%. * Adjust PEEP: Adjust PEEP in increments of 3 - 5 cm H20. Monitor for any ICP response to this change. * Perform bronchoscopy |
| TIER 3 (Tier 3 therapies are optional).   * Pentobarbital coma, according to local protocol. \* * Decompressive craniectomy. * Adjust temperature to 32-35°C, using active cooling measures. * Adjust ventilatory rate for target PaCO2 of 30 – 35 mm Hg and target pH of less than 7.50 * Other salvage therapy per local protocol and practice patterns   \*Note: Please refer to MOP regarding comments on various interventions with an \* | **TIER 3 (Tier 3 therapies are optional).**   * Adjust ventilatory rate to increase PaCO2 to > 45 mm Hg while maintaining a target pH of 7.30 – 7.45. \* * Increase cardiac output with inotropes (milrinone, dobutamine). * Assess for vasospasm with transcranial dopplers, CT angiogram, or cerebral angiogram. If present, treat with augmentation of CPP. * Hyperventilation (per the CO2 challenge described in MOP) to address possible ‘reverse Robin-Hood syndrome’. \* * Other salvage therapy based on local protocol and practice patterns. * Other potential causes / interventions for low PbtO2 should be considered:   + Consider cortical spreading depolarization via ECog   + Assess for pulmonary embolism per local protocol If present, initiate anticoagulation or IVC filter.   + Assess for cerebral venous thrombosis | **TIER 3 (Tier 3 therapies are optional).**   * Pentobarbital coma, according to local protocol. \* * Decompressive craniectomy. * Adjust temperature to 32-35°C, using active cooling measures. * Increase cardiac output with inotropes (milrinone, dobutamine). * Assess for vasospasm with transcranial dopplers, CT angiogram, or cerebral angiogram. If present, treat with augmentation of CPP. * Hyperventilation (per the CO2 challenge described in MOP) to address possible ‘reverse Robin-Hood syndrome’. **\*** * Other salvage therapy based on local protocol and practice patterns. * Other potential causes / interventions for low PbtO2 should be considered:   + Consider cortical spreading depolarization via ECog   + Assess for pulmonary embolism per local protocol If present, initiate anticoagulation or IVC filter.   + Assess for cerebral venous thrombosis |

**Contacts:**

(Sites may use this space to place their contact information for the study coordinator and site PIs)