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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.
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| 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
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| 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
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**Contacts:**

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