

SUGGESTED INTERVENTIONS FOR THE MANAGEMENT OF
CEREBRAL OXYGENATION AND INTRACRANIAL HYPERTENSION

Cerebral Oxygen Extraction Ratio (O₂ER) = $\frac{\text{Cerebral Oxygen Consumption (CMRO}_2\text{)}}{\text{Cerebral Oxygen Delivery (CDO}_2\text{)}}$

\uparrow O₂ER = $\frac{\uparrow \text{CMRO}_2}{\uparrow \text{CDO}_2}$ + O₂ER = $\frac{\uparrow \text{CMRO}_2}{\uparrow \text{CDO}_2}$

O₂ER = $\frac{\text{Arterial Oxygen Saturation} - \text{Jugular Bulb Venous Oxygen Saturation} \times 100}{\text{Arterial Oxygen Saturation}}$

Normal Range: 25-35%
(not > 40%)

Suggested Interventions:

All Patients:

- Elevate head of bed 30°.
- Head in neutral position.
- Jugular bulb, central venous and arterial catheters.
- Normal Saline maintenance IV.
- Maintain MAP \geq 70 mmHg.
- Maintain PaO₂ \geq 70 mmHg.
- Maintain normal serum sodium.
- Maintain normal coagulation.
- Maintain glucose between 4 and 7 mmol/L.
- Fever prophylaxis: Acetaminophen 650 mg NG q4h.
- * Consider Magnesium Sulfate 40 msq (20 mmol) IV q8h x 48 hours.
- * Consider moderate hypothermia 34-36° C.

Cerebral O₂ Extraction Ratio

< 40%

> 40%

- Maintain current PaCO₂.
- Observe.

- Maintain hemoglobin \geq 100 gm/L.
- If hyperventilated allow PaCO₂ to rise until O₂ER < 40% or ICP > 20 mmHg.
- Decrease stimulation.
- Sedation/analgesics/paralysis.
- Treat any fever.
- \uparrow MAP: If CVP low \uparrow intravascular volume. If CVP high \uparrow MAP to desired range with Dopamine or Levophed.
- Consider nursing patient in supine position.
- Consider barbiturate therapy.

Intracranial Pressure

- Decrease stimulation.
- Sedation/analgesics/paralysis.
- Treat any fever.
- Hyperventilate to cerebral O₂ER no greater than 40%.
- If EVD in place drain CSF with bag levelled at 26 cm H₂O.
- Mannitol 20% (0.25 - 1 gm/kg bolus). If repeated doses required keep serum osmolality less than 310 mosm.
- Repeat CT scan to rule out expanding mass lesion.
- \uparrow MAP: If CVP low \uparrow intravascular volume. If CVP high \uparrow MAP to desired range with Dopamine or Levophed.
- Consider barbiturate therapy.

> 20 mmHg

- Maintain current PaCO₂.
- Maintain hemoglobin \geq 100 gm/L.
- Decrease stimulation.
- Sedation/analgesics/paralysis.
- Treat any fever.
- If EVD in place drain CSF with bag levelled at 26 cm H₂O.
- Mannitol 20% (0.25 - 1 gm/kg bolus). If repeated doses required keep serum osmolality less than 310 mosm.
- \uparrow MAP: If CVP low \uparrow intravascular volume. If CVP high \uparrow MAP to desired range with Dopamine or Levophed.
- Repeat CT scan to rule out expanding mass lesion.
- Consider barbiturate therapy.

* DO NOT ADMINISTER MAGNESIUM SULFATE OR EMPLOY HYPOTHERMIA IF THE PATIENT IS ENTERED IN ANY HEAD INJURY STUDY.