Resuscitation - Coma

Background

- The unconscious and unresponsive child is a very serious and potentially life threatening situation.
- The key to treatment is quick stabilisation and treatment of life threats, then careful but quick evaluation of the cause and treatment of reversible causes.
- Any child with a VP shunt with decreased conscious state should be assumed to have a shunt blockage and raised intracranial pressure until proven otherwise.
- Senior emergency doctor or specialist (e.g. ICU or anaesthetics) help is usually warranted and should be considered early.

Common Causes of Unconsciousness

- Trauma
- Sepsis
- Seizures/post ictal
- Ingestion
- Endocrine and Electrolyte abnormalities

Assessment

Assessment of conscious level

- Two scales which are readily assessable and recordable are the:
- **AVPU**
  - A – Alert/Awake
  - V – Responds to voice
  - P – Responds to painful stimuli
  - U – Unresponsive/Unconscious
- **Glasgow Coma Scale** GCS (modified for children)

### Modified Glasgow Coma Scale

<table>
<thead>
<tr>
<th></th>
<th>&lt; 1 year</th>
<th>1-4 years</th>
<th>&gt; 5 years</th>
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</thead>
<tbody>
<tr>
<td><strong>Eyes Open</strong></td>
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<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>3</td>
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<td></td>
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<tr>
<td>2</td>
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<td></td>
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<tr>
<td>1</td>
<td></td>
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<tr>
<td><strong>Best Verbal Response</strong></td>
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<td></td>
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<tr>
<td>5</td>
<td>Normal vocal sounds, cries, periods of quiet wakefulness</td>
<td>Alert – word or phrases of usual ability</td>
<td>Orientated, appropriate words and phrases to usual ability</td>
</tr>
<tr>
<td>4</td>
<td>Spontaneous irritable cries</td>
<td>Less than usual words, spontaneous irritable cry</td>
<td>Confused/disorientated</td>
</tr>
<tr>
<td>3</td>
<td>Cries to pain only</td>
<td>Cries or vocal sounds to pain only</td>
<td>Inappropriate words</td>
</tr>
<tr>
<td>2</td>
<td>Moan, grimace/facial movement to central pain</td>
<td>Occasional whimper or moan to pain</td>
<td>Incomprehensible sounds</td>
</tr>
<tr>
<td>1</td>
<td>No response</td>
<td>No response</td>
<td>No response</td>
</tr>
<tr>
<td><strong>Best Motor Response</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>6</td>
<td>Moves spontaneously and purposefully</td>
<td>Obey commands/usual movements</td>
<td>Obey commands/usual movements</td>
</tr>
<tr>
<td>5</td>
<td>Localises to stimuli</td>
<td>Localises to painful stimulus</td>
<td>Localises to painful stimulus</td>
</tr>
<tr>
<td>4</td>
<td>Withdraws in response to pain</td>
<td>Withdraws in response to pain</td>
<td>Withdraws in response to pain</td>
</tr>
<tr>
<td>3</td>
<td>Responds to pain with abnormal extension</td>
<td>Abnormal flexion</td>
<td>Abnormal flexion</td>
</tr>
<tr>
<td>2</td>
<td>Responds to pain with abnormal extension</td>
<td>Abnormal extension</td>
<td>Abnormal extension</td>
</tr>
<tr>
<td>1</td>
<td>No response</td>
<td>No response</td>
<td>No response</td>
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### History
Key points to obtain:
• Past history, particularly the presence of Ventriculo-peritoneal (VP) shunt
• Recent injuries, especially head injuries
• Progress of unconsciousness - sudden or slowly progressive deterioration
• Fever
• Headaches (and onset of headaches - abrupt or progressive)
• Neck stiffness
• Vomiting
• Medications that might have been accessible

Investigations
Investigations and blood tests are likely to be needed unless diagnosis is absolutely clear
Consider:
• Glucose (Don't Ever Forget Glucose)
• Blood Gas (arterial or venous)
• FBC
• UEC
• Calcium
• Blood cultures (if febrile or sepsis is considered a possibility)
• CT head - likely to be needed, but make decision in consultation with senior clinician
• EEG – rarely needed as an acute investigation, but consider in non-convulsive status (in consultation with neurology)
• Blood alcohol level and drug screen

Management
Any patient who scores a P in the AVPU or < 9 on the Glasgow Coma Scale requires airway support.

Resuscitation
• Airway + C-Spine Immobilisation
  ◦ Assess adequacy and ensure there is no obstruction
  ◦ Have a low threshold for early intubation
• Breathing
  ◦ Support with oxygen and assisted ventilation if needed
  ◦ Beware of hypoventilation and rising CO2 – causes raised intracranial pressure
• Circulation
  ◦ Assess for signs of shock (slow capillary refill, hypotension) and treat appropriately
• Disability
  ◦ Rapid neurological assessment
  ◦ If seizures occurring or non-convulsive status thought likely refer to Status Epilepticus
• Glucose
  ◦ Early evaluation of BGL
    ■ If low give 2mL/kg of 10% glucose
    ■ If BGL > 11 mmol/L refer to Diabetic Ketoacidosis
  ◦ Collect growth hormone/cortisol/insulin levels if glucose is low
• Seek the cause of the coma

Potential Causes
Trauma
• Accidental or non accidental
<table>
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<tr>
<th>Hypoxic-ischaemic injury</th>
<th>Cardiorespiratory arrest, shock syndromes, near-drowning, smoke inhalation</th>
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<tbody>
<tr>
<td>Intracranial Infection</td>
<td>Meningitis, Encephalitis, Post-infectious</td>
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<tr>
<td>Mass Lesion</td>
<td>Haematomata, Abscess, Tumour</td>
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<tr>
<td>Fluid, Electrolytes, Acid-base</td>
<td>Hypernatraemia, Hyponatramia, Acidosis/Alkalosis</td>
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<tr>
<td>Epilepsy Disorders</td>
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<tr>
<td>Systemic Infection</td>
<td>Sepsis syndrome, Septic encephalopathy</td>
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<td>Complications of Malignancy</td>
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<td>Poisoning</td>
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<td>Acute Ventricular Obstruction</td>
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<tr>
<td>Vascular</td>
<td>Arteriovenous malformations, Embolism, Venous thrombosis, Arteritis Homocysteineuria</td>
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<tr>
<td>Hypertensive Encephalopathy</td>
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<tr>
<td>Endocrine Dysfunction</td>
<td>Hypoglycaemia</td>
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<td></td>
<td>Diabetes mellitus</td>
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<td></td>
<td>Diabetes insipidus</td>
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<tr>
<td>Respiratory Failure</td>
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<td>Renal Failure</td>
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<td>Hepatic Encephalopathy</td>
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<tr>
<td>Reye’s Syndrome</td>
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<tr>
<td>Inherited Metabolic Disorders</td>
<td>Lactic acidosis</td>
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<td>Urea cycle disorder</td>
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<td>Aminoacidopathies</td>
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<tr>
<td>Hypothermia, Hyperthermia</td>
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<tr>
<td>Iatrogenic</td>
<td>Overcorrection of acidosis</td>
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<tr>
<td></td>
<td>Overhydration</td>
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<td></td>
<td>Drug overdose</td>
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<th>Dr Meredith Borland HoD, PMH Emergency Department</th>
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