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)** 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>
</tr>
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<tbody>
<tr>
<td><strong>Eyes Open</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Spontaneous</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>To speech and touch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>To pain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>No response</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Best Verbal Response</strong></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>5</td>
<td>Spontaneous irritable cries</td>
<td>Less than usual words, spontaneous irritable cry</td>
<td>Confused/disorientated</td>
</tr>
<tr>
<td>4</td>
<td>Cries to pain only</td>
<td>Cries or vocal sounds to pain only</td>
<td>Inappropriate words</td>
</tr>
<tr>
<td>3</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>2</td>
<td>No response</td>
<td>No response</td>
<td>No response</td>
</tr>
<tr>
<td><strong>Best Motor Response</strong></td>
<td>Moves spontaneously and purposefully</td>
<td>Obey commands/usual movements</td>
<td>Obey commands/usual movements</td>
</tr>
<tr>
<td>6</td>
<td>Localises to stimuli</td>
<td>Localises to painful stimulus</td>
<td>Localises to painful stimulus</td>
</tr>
<tr>
<td>5</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>4</td>
<td>Responds to pain with abnormal extension</td>
<td>Abnormal flexion</td>
<td>Abnormal flexion</td>
</tr>
<tr>
<td>3</td>
<td>Responds to pain with abnormal extension</td>
<td>Abnormal extension</td>
<td>Abnormal extension</td>
</tr>
<tr>
<td>2</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
### Hypoxic-ischaemic injury
- Cardiorespiratory arrest, shock syndromes, near-drowning, smoke inhalation

### Intracranial Infection
- Meningitis, Encephalitis, Post-infectious

### Mass Lesion
- Haematoma, Abscess, Tumour

### Fluid, Electrolytes, Acid-base
- Hypernatraemia, Hyponatramia, Acidosis/Alkalosis

### Epilepsy Disorders

### Systemic Infection
- Sepsis syndrome, Septic encephalopathy

### Complications of Malignancy

### Poisoning

### Acute Ventricular Obstruction

### Vascular
- Arteriovenous malformations, Embolism, Venous thrombosis, Arteritis Homocysteineuria

### Hypertensive Encephalopathy

### Endocrine Dysfunction
- Hypoglycaemia
- Diabetes mellitus
- Diabetes insipidus

### Respiratory Failure

### Renal Failure

### Hepatic Encephalopathy

### Reye’s Syndrome

### Inherited Metabolic Disorders
- Lactic acidosis
- Urea cycle disorder
- Aminoacidopathies

### Hypothermia, Hyperthermia

### Iatrogenic
- Overcorrection of acidosis
- Overhydration
- Drug overdose

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<th>Dr Meredith Borland HoD, PMH Emergency Department</th>
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<td>Kids Health WA Guidelines Team</td>
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