The Management of a Child (aged 0 – 18 years) with a Decreased Conscious Level

An evidence-based guideline for health professionals based in the hospital setting

Review date January 2008

Nationally developed by
The Paediatric Accident and Emergency Research Group

Appraised by

Royal College of Paediatrics and Child Health

British Association for Emergency Medicine
Guideline for the management of a child aged 0-18 years with a decreased conscious level

Explanatory notes
Recommendations marked with the symbol A or B are based on the highest quality of evidence

Entry criteria
The following algorithm should be used for children aged 0 – 18 years who present to hospital with a reduced level of consciousness. This is defined as scoring <15 on the Glasgow Coma Scale (GCS) modified for children or responding only to voice, pain or being unresponsive on the AVPU scale. Ensure the child is maximally roused from sleep before recording conscious level.

Exclusion criteria
Infants on a neonatal intensive care unit.
Children with a known condition for episodes of reduced conscious level (e.g. epilepsy, diabetes) where a management plan is already agreed upon.
Children with learning disabilities, whose score on the GCS is <15 when they are healthy.

In certain children with reduced conscious level, it may be appropriate to watch and wait. However, if a decision is made to stick a needle into a child to investigate the cause, take all the samples listed as “core investigations” at the first opportunity.

<table>
<thead>
<tr>
<th>Glasgow coma scale with modification for children</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Best eye response</strong></td>
</tr>
<tr>
<td>1. No eye opening</td>
</tr>
<tr>
<td>2. Eye opening to pain</td>
</tr>
<tr>
<td>3. Eye opening to verbal command</td>
</tr>
<tr>
<td>4. Eyes open spontaneously</td>
</tr>
<tr>
<td><strong>Best verbal response (use one of the following)</strong></td>
</tr>
<tr>
<td><strong>Adult version (aged 5 +)</strong></td>
</tr>
<tr>
<td>1. No verbal response</td>
</tr>
<tr>
<td>2. Incomprehensible sounds</td>
</tr>
<tr>
<td>3. Inappropriate words</td>
</tr>
<tr>
<td>4. Confused</td>
</tr>
<tr>
<td>5. Orientated</td>
</tr>
<tr>
<td><strong>Best motor response</strong></td>
</tr>
<tr>
<td>1. No motor response to pain</td>
</tr>
<tr>
<td>2. Abnormal extension to pain</td>
</tr>
<tr>
<td>3. Abnormal flexion to pain</td>
</tr>
<tr>
<td>4. Withdrawal to painful stimuli</td>
</tr>
<tr>
<td>5. Localises to painful stimuli or withdraws to touch</td>
</tr>
<tr>
<td>6. Obeys commands or performs normal spontaneous movements</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AVPU Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Record the condition which best describes the patient</td>
</tr>
<tr>
<td>Alert</td>
</tr>
<tr>
<td>responds to Voice</td>
</tr>
<tr>
<td>Pain</td>
</tr>
<tr>
<td>Unresponsive</td>
</tr>
</tbody>
</table>
Algorithm for the management of a child aged 0-18 years with a decreased conscious level

Patient entry criteria (see page 2)

GCS<15 V, P or U on AVPU scale

Assessment
- AIRWAY
- BREATHING
- CIRCULATION
- DISABILITY

Give oxygen
- Consider intubation if:
  - Airway obstructs if not supported
  - Airway compromised by vomiting
  - Resp rate inadequate for ventilation
  - O₂ sats <92% despite high flow O₂ / airway opening manoeuvres
  - Signs of shock despite 40ml/kg fluid
  - Exhaustion
  - GCS<8 or deteriorating
  - Signs of raised ICP

See Problem list below

Monitoring
- Heart rate **
- Resp rate *
- O₂ sats **
- BP *
- Temperature
- ECG * recorded every hour
  + monitored continuously

GCS assessment
- If GCS <12 every 15mins
- If GCS 12-14 every hour

Start urine collection

Core investigations (see page 9)

All children
- Capillary Glucose
- Blood gas (capillary, venous, arterial)
- Urinalysis (dipstick at bedside)
- Laboratory glucose (even if capillary glucose normal)
- Urea and electrolytes (Na, K, Cr)
- Liver function tests
- Plasma ammonia
- Full blood count
- Blood culture
- 1-2ml plasma to be separated, frozen and saved
- 1-2ml plain serum to be separated, frozen and saved
- 10ml urine to be frozen and saved

History features to ask about
- Vomiting
- Headache
- Fever
- Convulsions
- Alternating periods of consciousness
- Trauma
- Ingestion of drugs
- Presence of any drugs at home
- Any previous infant deaths in family
- Length of symptoms

Examine the child

Problem list
- Shock
- Sepsis
- Intracranial infections
- Trauma
- Raised ICP
- Hypertension
- Metabolic illness
- Prolonged convulsions
- Post-convulsive state

Identify all the problems considered below (see pages 4 and 5)

Cause unknown e.g. drug ingestion

Management
- Manage concurrently all the problems identified from the Problem list (see pages 6, 7 and 8)
Identify All Problems
Several suspected problems may co-exist and need concurrent management. Identify if each problem is suspected and tick the box □. When all problems have been considered go to tables for tests and treatments (pages 6, 7, and 8).

**SHOCK □ Go to table 1**

*Recognised* clinically if reduced consciousness and one or more of the following:
- Capillary refill > 2 seconds
- Mottled, cool extremities
- Diminished peripheral pulses
- Systolic BP < 5th percentile for age
- Decreased urine output <1ml/kg/hour

**SEPSIS □ Go to table 2**

*Recognised* clinically if reduced consciousness and two or more of the following 4:
- Temp >38°C or <36°C
- Tachycardia
- Tachypnoea
- White cell count <4000cumm or >12000cumm or
- a non-blanching rash

**TRAUMA □ Go to table 3**

*Recognised* from history and examination findings

**DIABETIC KETOACIDOSIS □ Go to table 4**

*Recognised* if reduced consciousness and all of the following:
- Capillary glucose >11mmol/l
- pH <7.3
- Ketones in urine

**HYPOGLYCAEMIA □ Go to table 5**

*Recognised* if reduced consciousness and capillary glucose < 2.6 mmol/l (if capillary glucose 2.6 - 3.5 check glucose result from core investigations urgently)

**HYPERAMMONAEMIA □ Go to table 6**

*Recognised* if plasma ammonia >200 micromol/l

**NON-HYPERGLYCAEMIC KETOACIDOSIS □ Go to table 7**

*Recognised* if reduced consciousness and pH <7.3 and ketones in urine without hyperglycaemia

**BACTERIAL MENINGITIS □ Go to table 8**

*Recognised* clinically if neck stiffness / pain and total summed score is 8.5 or more using the following rule:

<table>
<thead>
<tr>
<th>Symptom/sign</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>GCS ≤ 8</td>
<td>= 8</td>
</tr>
<tr>
<td>Neck stiffness</td>
<td>= 7.5</td>
</tr>
<tr>
<td>Time of symptoms</td>
<td>= 1 per each 24hrs</td>
</tr>
<tr>
<td>Vomiting</td>
<td>= 2</td>
</tr>
<tr>
<td>Cyanosis</td>
<td>= 6.5</td>
</tr>
<tr>
<td>Petechiae</td>
<td>= 4</td>
</tr>
<tr>
<td>Serum CRP</td>
<td>= (CRP in mg/l) / 100 or</td>
</tr>
</tbody>
</table>

If no neck stiffness suspect bacterial meningitis if fever and two or more of the following 3:
- Rash
- Bulging fontanelle
- Irritability
Have you identified all the suspected problems?

Only move on to the tables for further tests and treatments (pages 6, 7, and 8) when ALL PROBLEMS have been considered.
### Management of all 16 identified problems

**Table 1** **SHOCK**

#### Investigations
Core Investigations and look for sepsis, trauma, anaphylaxis, heart failure

#### Treatment:
- Fluid bolus 20ml/kg (colloid / crystalloid) \( A \) and assess response (good response = \( \uparrow \) tachycardia, improved capillary refill time, \( \uparrow \) urine output, \( \uparrow \) GCS)
- Further fluid therapy guided by clinical response and >60ml/kg may be required \( B \)
- If >40ml/kg has been given consider intubation / ventilation and drugs for circulatory support

**Table 2** **SEPSIS**

#### Investigations
Core Investigations and consider: coaguulation studies, chest X-ray, throat swab, lumbar puncture (if safe*), urine culture (if urinalysis +ve), PCR meningococcus / pneumococcus, skin swab, joint aspiration, thick/thin film, intracranial imaging (if no source detected)

#### Treatment:
- Broad spectrum IV antibiotics after appropriate cultures have been taken
- Review by experienced paediatrician within 1 hour of admission

**Table 3** **TRAUMA**

#### Investigations
Imaging appropriate to examination
Consider Core Investigations if medical collapse led to cause of trauma

#### Treatment:
- Follow ATLS guidelines

**Table 4** **DIABETIC KETOACIDOSIS**

#### Investigations
Core Investigations

#### Treatment:
- Follow NICE guideline for DKA in children and young people

**Table 5** **HYPOGLYCAEMIA**

#### Investigations
If lab glucose result from Core Investigations is <2.6mmol/l then request following tests from saved samples: plasma lactate, insulin, cortisol, growth hormone, free fatty acids, beta-hydroxybutyrate, acyl-carnitine profile (on “Guthrie card” or saved frozen plasma) and urine amino / organic acids

#### Treatment:
- After Core Investigations taken:
  - child > 4 weeks old give 5ml/kg I.V. 10% glucose bolus
  - child ≤ 4 weeks old give 2ml/kg I.V. 10% glucose bolus
  - Start IV infusion 10% glucose to keep blood glucose between 4 and 7 mmol/l
  - Seek advice from endocrinologist / metabolic specialist for further management

**Table 6** **HYPERAMMONAEMIA**

#### Investigations
If ammonia result from Core Investigations is >200 micromol/l then request following from saved samples:
- plasma amino acids, urine amino acids, urea, organic acids, urine orotic acid
- and check coagulation studies

#### Treatment:
- Seek urgent advice from a metabolic specialist
- Start IV sodium benzoate (loading dose 250mg/kg over 90 mins; followed by infusion 250mg/kg over 24 hrs – both diluted in 15ml/kg 10% glucose)
- If ammonia >500 micromol/l or is not improving and remains between 200-500 micromol/l after 6 hours of sodium benzoate therapy, consider emergency haemodialysis

*For acute contraindications and other details regarding lumbar punctures see Table 17*
Management of all 16 identified problems

### Table 7: Non-Hyperglycaemic Ketoacidosis

<table>
<thead>
<tr>
<th>Investigations</th>
<th>Treatment:</th>
</tr>
</thead>
</table>
| If pH < 7.3, ketones in urine and a normal or low capillary glucose noted from Core Investigations then request following from saved samples: plasma lactate, plasma amino acids, urine amino acids, urine organic acids | - Seek urgent advice from a metabolic specialist if child has non-hyperglycaemic ketoacidosis or plasma lactate >15mmol/l  
- Carefully monitor fluid balance due to risk of raised ICP  
- Nutrition should be re-started early to prevent catabolism |

### Table 8: Bacterial Meningitis

<table>
<thead>
<tr>
<th>Investigations</th>
<th>Treatment:</th>
</tr>
</thead>
</table>
| Core Investigations and lumbar puncture (if safe*) | - Give IV dexamethasone 0.15mg/kg before / with antibiotics  
A - Broad spectrum antibiotics  
A - don’t delay if lumbar puncture contraindicated* |

### Table 9: Herpes Simplex Encephalitis (HSE)

<table>
<thead>
<tr>
<th>Investigations</th>
<th>Treatment:</th>
</tr>
</thead>
</table>
| Core Investigations and consider: MRI scan, EEG, lumbar puncture (if safe*) for HSV PCR | - Give IV aciclovir 10mg/kg (or 500mg/m² if aged 3 months to 12 years) TDS  
A - don’t delay if lumbar puncture contraindicated*  
A - Treatment should continue for 14 days if HSE highly suspected  
If no ongoing clinical suspicion of HSE aciclovir can be stopped before 14 days |

### Table 10: Intracranial Abscess

<table>
<thead>
<tr>
<th>Investigations</th>
<th>Treatment:</th>
</tr>
</thead>
</table>
| Core Investigations and CT scan | - Broad spectrum antibiotics after blood cultures taken  
- Seek urgent advice from a paediatric neurosurgeon |

### Table 11: TB Meningitis

<table>
<thead>
<tr>
<th>Investigations</th>
<th>Treatment:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Investigations and lumbar puncture (if safe*)</td>
<td>- If CSF microscopy is abnormal seek urgent advice from microbiology department</td>
</tr>
</tbody>
</table>

### Table 12: Raised ICP

<table>
<thead>
<tr>
<th>Investigations</th>
<th>Treatment:</th>
</tr>
</thead>
</table>
| Core Investigations and consider CT scan | - Position patient’s head in midline  
- Tilt patient head-up 20 degrees and avoid neck lines  
- Maintenance fluids should not be hypotonic  
B - Rate of maintenance fluids to be agreed locally  
- Consider intubation and maintain PaCO₂ between 4.0 - 4.5kPa  
- Mannitol or 3% saline indications and dose to be agreed locally |

### Table 13: Hypertension

<table>
<thead>
<tr>
<th>Investigations</th>
<th>Treatment:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core Investigations especially reviewing urinalysis, creatinine and urea, look for raised ICP, papilloedema, and check four limb BP</td>
<td>- Seek urgent advice from a paediatric nephrologist or intensivist</td>
</tr>
</tbody>
</table>

*For acute contraindications and other details regarding lumbar punctures see Table 17*
Management of all 16 identified problems

### Table 14  PROLONGED CONVULSION

**Investigations**

Core Investigations if child not known to have epilepsy

If child under 12 months old request plasma calcium and magnesium

**Treatment:**

- Follow APLS guidelines for anticonvulsant therapy
- **If the convulsion is ongoing** despite anticonvulsants, consider specific treatments for electrolyte imbalance, e.g.
  - plasma sodium <115mmol/l, give 5ml/kg of 3% saline IV over one hour
  - plasma calcium is <1.7mmol/l or ionized calcium <0.75 mmol/l, give 0.3ml/kg of 10% calcium gluconate IV over 5 mins
  - plasma magnesium <0.65mmol/l, give 50mg/kg of magnesium sulphate IV over one hour

### Table 15  POST CONVULSIVE STATE

**Investigations**

- It may be appropriate to closely observe the child if normal capillary glucose, without performing any further tests, in the first hour
- Detailed history and exam
  - If still reduced GCS after one hour perform Core Investigations and investigations for “Cause unknown” (Table 16)

**Treatment:**

- Treat according to history and examination findings
- If after 1 hour child has not recovered to their normal conscious level, treat as “Cause unknown” (Table 16)

### Table 16  CAUSE UNKNOWN

**Investigations**

Core Investigations and if after reviewing these results the cause of reduced consciousness remains unknown request / perform the following: CT scan, lumbar puncture (if safe*), urine toxicology screen, urine organic and amino acids, plasma lactate

If the cause is still unknown after reviewing Core Investigations results, CT scan and initial CSF results, consider the following: EEG (?non-convulsive status); acyl-carnitine (on Guthrie card or from saved plasma); ESR and autoimmune screen (?cerebral vasculitis); thyroid function test and thyroid autoantibodies (?Hashimoto’s encephalitis)

**Treatment:**

- Supportive treatments to protect airway, breathing and circulation
- Start broad spectrum antibiotics and IV aciclovir
- Discuss with paediatric neurologist within 6 hours of admission

*For acute contraindications and other details regarding lumbar punctures see Table 17

### Table 17  LUMBAR PUNCTURE

A lumbar puncture should be deferred or not performed as part of the initial acute management in a child who has:

- GCS ≤ 8
- deteriorating GCS
- focal neurological signs
- had a seizure lasting more than 10 mins and still has a GCS ≤ 12
- abnormal breathing pattern
- abnormal doll’s eye response
- abnormal posture
- shock
- bradycardia (heart rate <60)
- hypertension (BP >95th centile for age)
- clinical evidence of systemic meningococcal disease
- pupillary dilatation (unilateral / bilateral)
- pupillary reaction to light impaired or lost
- signs of raised ICP

A normal CT scan does not exclude acutely raised ICP

If a lumbar puncture is performed, CSF should be sent for microscopy, gram staining, culture and sensitivity, glucose, protein, PCR for HSE and other viruses
ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
<th>Abbreviation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>BP</td>
<td>Blood pressure</td>
<td>ICP</td>
<td>Intracranial pressure</td>
</tr>
<tr>
<td>CSF</td>
<td>Cerebrospinal fluid</td>
<td>IV</td>
<td>Intravenous</td>
</tr>
<tr>
<td>DKA</td>
<td>Diabetic ketoacidosis</td>
<td>TB</td>
<td>Tuberculosis</td>
</tr>
<tr>
<td>GCS</td>
<td>Glasgow coma scale</td>
<td>Temp</td>
<td>Temperature</td>
</tr>
</tbody>
</table>

Useful information:

**LOCAL CONTACT DETAILS** (e.g. name / hospital / contact number / out of hours service):

Anaesthetist covering paediatrics =
PICU =
Metabolic specialist / Biochemist =
Paediatric neurologist =
Paediatric neurosurgeon =
Paediatric endocrinologist =
CT service =
EEG service =
Toxicology unit =

Toxbase = [www.spib.axl.co.uk](http://www.spib.axl.co.uk)

CORE INVESTIGATIONS

These will be requested in most children with reduced conscious level.

**Bedside tests**

Capillary glucose
Blood gas (capillary / venous / arterial)
Urinalysis (dipstick)

<table>
<thead>
<tr>
<th>Laboratory tests</th>
<th>Request form (what to write)</th>
<th>Bottle (top colour)</th>
<th>Volume of sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical chemistry</td>
<td>Glucose</td>
<td>Fluoride oxalate(grey)</td>
<td>0.5ml</td>
</tr>
<tr>
<td></td>
<td>Urea, electrolytes, and creatinine</td>
<td>Lithium heparin (green)</td>
<td>2.5ml</td>
</tr>
<tr>
<td></td>
<td>Liver function tests</td>
<td>Plain (red)</td>
<td>1.0ml</td>
</tr>
<tr>
<td></td>
<td>Ammonia</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Saved sample plasma and serum (separated and frozen)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Haematology</td>
<td>FBC</td>
<td>EDTA (pink)</td>
<td>0.5ml</td>
</tr>
<tr>
<td>Microbiology</td>
<td>Blood culture and sensitivity</td>
<td>Culture bottle</td>
<td>0.5ml</td>
</tr>
<tr>
<td>Clinical chemistry</td>
<td>Urine save and freeze sample</td>
<td>Urine plain container</td>
<td>10ml urine if possible</td>
</tr>
</tbody>
</table>

Your labs may use different coloured bottles or require different volumes.
# Useful drug information:

Below is a list of infusions which may be required for support or treatment. Please check with your local pharmacist that the infusion calculations are appropriate for your local procedures.

## Infusions to support the circulation:

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dose calculation</th>
<th>Fluid</th>
<th>Dose per kg per unit time</th>
<th>Usual dose range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adrenaline / Epinephrine</td>
<td>0.3mg x wt (kg) in 50mls</td>
<td>5% Glucose</td>
<td>1ml / hr = 0.1 microgram/kg/min</td>
<td>0.1 – 1 microgram/kg/min</td>
</tr>
<tr>
<td>Noradrenaline base</td>
<td>0.3mg x wt (kg) in 50mls</td>
<td>5% Glucose</td>
<td>1ml / hr = 0.1 microgram/kg/min</td>
<td>0.1 – 1 microgram/kg/min</td>
</tr>
<tr>
<td>Dopamine</td>
<td>30mg x wt (kg) in 50mls</td>
<td>5% Glucose</td>
<td>1ml / hr = 10 microgram/kg/min</td>
<td>2 – 20 microgram/kg/min</td>
</tr>
<tr>
<td>Dobutamine</td>
<td>30mg x wt (kg) in 50mls</td>
<td>5% Glucose</td>
<td>1ml / hr = 10 microgram/kg/min</td>
<td>2 – 20 microgram/kg/min</td>
</tr>
</tbody>
</table>

## Infusions for ongoing sedation in a ventilated child:

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dose calculation</th>
<th>Fluid</th>
<th>Dose per kg per unit time</th>
<th>Usual dose range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morphine</td>
<td>1mg x wt (kg) in 50mls</td>
<td>5% Glucose</td>
<td>1ml / hr = 20 microgram/kg/hour</td>
<td>10 – 40 microgram/kg/hour</td>
</tr>
<tr>
<td>Midazolam</td>
<td>3mg x wt (kg) in 50mls</td>
<td>5% Glucose</td>
<td>1ml / hr = 1 microgram/kg/min</td>
<td>0.5 – 4 microgram/kg/min</td>
</tr>
<tr>
<td>Fentanyl</td>
<td>0.125mg x wt (kg) in 50mls</td>
<td>5% Glucose</td>
<td>1ml / hr = 2.5 microgram/kg/hour</td>
<td>1 – 3 microgram/kg/hour</td>
</tr>
<tr>
<td>Ketamine</td>
<td>30mg x wt (kg) in 50mls</td>
<td>5% Glucose</td>
<td>1ml / hr = 10 microgram/kg/min</td>
<td>10 – 45 microgram/kg/min</td>
</tr>
</tbody>
</table>

## Infusions for metabolic illnesses

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dose calculation</th>
<th>Fluid</th>
<th>Dose per kg per unit time</th>
<th>Usual dose range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insulin</td>
<td>50 units in 50mls</td>
<td>0.9% Saline</td>
<td>0.05 ml x wt (kg) / hr = 0.05 Units/kg/hour</td>
<td>0.025 – 0.1 Units/kg/hour</td>
</tr>
<tr>
<td>Sodium Benzoate</td>
<td>Loading dose: 250mg x wt (kg) add this to</td>
<td>15ml x wt (kg) 10% Glucose</td>
<td>Infuse whole volume over 90 minutes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Continuous infusion: 250mg x wt (kg) add this to</td>
<td>15ml x wt (kg) 10% Glucose</td>
<td>Infuse whole volume over 24 hours</td>
<td></td>
</tr>
<tr>
<td>Sodium Phenylbutyrate</td>
<td>Loading dose: 250mg x wt (kg) add this to</td>
<td>15ml x wt (kg) 10% Glucose</td>
<td>Infuse whole volume over 90 minutes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Continuous infusion: 250mg x wt (kg) add this to</td>
<td>15ml x wt (kg) 10% Glucose</td>
<td>Infuse whole volume over 24 hours</td>
<td></td>
</tr>
</tbody>
</table>
Infusions for convulsions due to electrolyte imbalance:

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dose calculation</th>
<th>Fluid for dilution</th>
<th>Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>3% Saline (3% sodium chloride)</td>
<td>Remove 36ml from a 500ml bag of 0.9% sodium chloride (saline). Add 36ml of 30% sodium chloride. This makes a 500ml bag of 3% sodium chloride.</td>
<td>5 ml x wt (kg) / hour single dose</td>
<td></td>
</tr>
<tr>
<td>Magnesium sulphate</td>
<td>2ml of 50% solution make up to 10ml with 5% Glucose (= 10% solution MgSO₄)</td>
<td>5% Glucose</td>
<td>0.5 ml x wt (kg) / hour single dose over 1 hour</td>
</tr>
<tr>
<td>Calcium gluconate</td>
<td>1g in 10ml = 10% solution</td>
<td>5% Dextrose</td>
<td>0.3 – 0.5 ml x wt (kg) over 5 mins</td>
</tr>
</tbody>
</table>

Infusions for raised intracranial pressure:

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dose calculation</th>
<th>Fluid</th>
<th>Dose per kg per unit time</th>
<th>Usual dose range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mannitol</td>
<td>1.25 ml x wt (kg)</td>
<td>20% mannitol</td>
<td>0.25g / kg / hour single dose over 30 mins</td>
<td>0.25 - 1.0g / kg (1.25 – 5 ml / kg)</td>
</tr>
<tr>
<td>3% saline (sodium chloride)</td>
<td>Remove 36ml from a 500ml bag of 0.9% saline. Add 36ml of 30% saline.</td>
<td>This makes a 500ml bag of 3% saline</td>
<td>5 ml x wt (kg) single dose over 1 hour</td>
<td></td>
</tr>
<tr>
<td>Thiopental Sodium</td>
<td>100mg x wt (kg) in 50ml</td>
<td>0.9% Sodium chloride</td>
<td>1ml / hour = 2mg / kg / hr</td>
<td>2 – 8 mg / kg /hr</td>
</tr>
</tbody>
</table>

Pharmacy information

Contact details =
Out of hours service =

Location of drugs for infusions

<table>
<thead>
<tr>
<th>Drug</th>
<th>Emergency availability of drug (e.g. ward / pharmacy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adrenaline / Epinephrine</td>
<td></td>
</tr>
<tr>
<td>Noradrenaline</td>
<td></td>
</tr>
<tr>
<td>Dopamine</td>
<td></td>
</tr>
<tr>
<td>Dobutamine</td>
<td></td>
</tr>
<tr>
<td>Morphine</td>
<td></td>
</tr>
<tr>
<td>Midazolam</td>
<td></td>
</tr>
<tr>
<td>Fentanyl</td>
<td></td>
</tr>
<tr>
<td>Ketamine</td>
<td></td>
</tr>
<tr>
<td>Sodium Benzoate</td>
<td></td>
</tr>
<tr>
<td>Sodium Phenylbutyrate</td>
<td></td>
</tr>
<tr>
<td>Magnesium sulphate</td>
<td></td>
</tr>
<tr>
<td>Calcium gluconate</td>
<td></td>
</tr>
<tr>
<td>30% saline (sodium chloride)</td>
<td></td>
</tr>
<tr>
<td>Mannitol</td>
<td></td>
</tr>
<tr>
<td>Thiopental Sodium</td>
<td></td>
</tr>
</tbody>
</table>
Further copies of this guideline are available for free at
www.nottingham.ac.uk/paediatric-guideline

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National Reyes Syndrome
Foundation UK

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