LRI Children's Hospital

Decreased Consciousness UHL Childrens Hospital Guideline

Staff relevant to:	Medical & Nursing staff working within the UHL Children's Hospital.
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1. Introduction and Scope

Decreased conscious level is an acute neurological emergency characterised by significant brain impairment, necessitating a rapid and methodical approach to evaluation and treatment. If left untreated, it could rapidly progress to secondary damage leading to significant morbidity or even death.

The aim of the Guideline is to give clinicians working acutely a framework to aid the timely and safe care of children and young people presenting with decreased conscious level.

Related documents:

- Lumbar Puncture UHL Childrens Hospital Guideline
- Basic Life Support or Choking UHL Childrens Nursing Guideline
- Sepsis UHL Childrens Hospital Guideline
- Metabolic Conditions UHL Childrens Medical Guideline
- Hypoglycaemia - in Children NOT Diagnosed with Diabetes UHL Childrens Hospital Guideline
- Diabetes (Including Diabetic Ketoacidosis) UHL Childrens Hospital Guideline
- Hyperammonaemia UHL Childrens Intensive Care Guideline
- Meningitis UHL Childrens Medical Guideline
- Encephalitis UHL Childrens Medical Guideline
- Raised Intracranial Pressure UHL Childrens Hospital Guideline

- Tuberculosis UHL Childrens Hospital Guideline
- Status Epilepticus UHL Childrens Medical Guideline

Contents

MANAGEMENT OF CHILDREN WITH ACUTE DECREASE IN CONSCIOUSNESS LEVEL (DECON)

Algorithm on management of children with acute decrease in consciousness level - Algorithm modified from RCPCH guidance

Identify DeCon GCS ≤ 14
AVPU = P or U

A Intubate if GCS <8, AVPU = U* or if there is suspected/proven raised intracranial pressure

B 100% Oxygen if oxygen SaO2 <95%

C If circulation compromised, give 10 ml/kg isotonic fluid bolus and reassess.

D Perform a capillary glucose as soon as possible, but not later than 15 min.

In a child with clinical diagnosis of raised ICP, before imaging consider sedation, intubation and ventilation to maintain PaCO2 between 4.5 and 5.0 kPa

* unless planned otherwise by intensivist/anaesthetist

Core investigations

Point of care tests: Capillary blood glucose, Blood gas for pH, PCO2, BE, Lactate & Urine dipstick

Laboratory tests: Glucose, U&Es, LFTs, FBC, Blood culture, Ammonia

Urine: Urinalysis for ketones, glucose, protein, nitrites and leucocytes

Consider urine toxicology and/or metabolic screen

DIFFERENTIAL DIAGNOSES

- Circulatory compromise
- Sepsis
- Trauma
- Metabolic
  - Hypoglyaemia
  - Hyperammonaemia
  - DKA
- Intracranial infection
- Raised ICP
- Convulsions
- Stroke
- Acute hydrocephalus
- Hypertensive encephalopathy
- Poisoning (alcohol/drugs)

Consider possibility of non-accidental injury or safeguarding concerns.

CAUSE UNCLEAR

Consider additional tests and involvement of specialists e.g. Neurologist or Metabolic expert

Additional tests:

- CT/MRI
- LP
- Urine Toxicology
- Urine organic and plasma amino acids
- Plasma lactate/EEG

Lumbar Puncture

Perform a lumbar puncture, when no acute contraindications exist, if the clinical working diagnosis is:

- Bacterial meningitis
- Viral encephalitis
- Tuberculous meningitis

Brain Imaging

Carry out urgent cranial CT or MRI scan when the child is stable if there are signs of:

- raised intracranial pressure
- focal neurological deficit
- Intracranial abscess

Consider if the cause remains unknown.

2.0 Guideline Standards and Procedures

2.1 Population

The term 'children' is used to include infants (over 28 days of age, excluding pre-term babies still in neonatal hospital care), children and young people up to 18 years.

2.2 Definition

A decreased conscious level is defined as being responsive only to voice, or pain, or being unresponsive on the Alert, Voice, Pain, Unresponsive Scale (AVPU), or a Glasgow Coma Score (GCS) or modified Glasgow Coma Score of 14 or less.

3. Recommendations

3.1 Assessment of airway

Consider intubating a child if they have a GCS less than 8 or are non-responsive to pain on the AVPU, unless the child is showing signs of improvement.

3.2 Assessment of breathing and oxygen requirements

Give prescribed oxygen if their oxygen saturation is 95% or less.

3.3 Assessment of capillary blood glucose

Perform a capillary glucose test *within 15 minutes of presentation* in a child with a decreased conscious level. If the blood glucose level is below 3 mmol/L, immediately correct the blood glucose level and consider performing hypoglycaemia screen.

3.4 Observations to monitor children with a decreased conscious level

Record following observations in a child with a decreased conscious level at first clinical assessment:

- Heart rate
- Respiratory rate
- Oxygen saturation level
- Blood pressure
- Physical appearance/state
- Temperature

Record the observations above *every hour* in a child with a decreased conscious level.

Continuously have cardiac monitoring (ECG leads) in a child with a decreased conscious level.

Assess and record conscious level at presentation using the Glasgow Coma Score/modified Glasgow Coma Score (GCS) or AVPU scale in a child who presents with a decreased conscious level.

If GCS level is equal to or less than 12 or level V on AVPU scale

Consider assessing and recording the GCS/modified GCS every 15 minutes

If GCS greater than 12 or level V on AVPU scale

Consider assessing and recording the GCS/modified GCS every 30 minutes

A decrease in GCS or AVPU score indicates the need for urgent medical review.

3.5 Identifying the causes of a decreased conscious level in children:

- Record following features when a child presents with a decreased conscious level:

Vomiting before or at presentation	Trauma
Headache before or at presentation	Ingestion of medications, alcohol or recreational drugs
Fever before or at presentation	Presence of medications in the child's home
Convulsions before or at presentation	Any infant deaths in the family
Alternating periods of consciousness	Duration of symptoms

Consider possibility of non-accidental injury or safeguarding concerns when assessing a child with a decreased conscious level

- Differential diagnoses of children with reduced consciousness (not exhaustive):

Shock: Hypovolaemic Distributive Cardiogenic	Intracranial infection: Meningitis Encephalitis
Sepsis	Raised intracranial pressure
Metabolic diseases: Hypoglycaemia Hyperammonaemia	Convulsions
Trauma	Recovering from convulsion ('post-ictal' state)
Hypertension	Stroke
Intoxication / poisoning	Acute hydrocephalus

3.6 Investigating the causes of a decreased conscious level in Children

- Core investigations:

Bedside tests	**Bloods**	**Urine**
Capillary blood glucose Blood gas (pH, pCO2, base excess, lactate)	-Urea and electrolytes -Full blood count and film -Plasma lactate - Liver function tests -Laboratory blood glucose - Plasma ammonia -Blood culture	Urinalysis (dipstick at bedside) for ketones, glucose, protein, nitrites and leucocytes Consider urine for toxicology and metabolic screen

Consider saving a plasma sample for future toxicology analysis if this is suspected.

3.7 Lumbar puncture and cranial imaging

- Perform a lumbar puncture, when no acute contraindications exist, if the clinical working diagnosis is:
    - Bacterial meningitis
    - Viral encephalitis, including herpes simplex encephalitis
    - Tuberculous meningitis

- Analyse cerebrospinal fluid initially for:
    - Microscopy, gram staining, culture and sensitivity
    - Glucose (compared to plasma glucose)

- Protein
- PCR for herpes simplex and other viruses
- Opening CSF pressure (if possible)

- Consider analysing cerebrospinal fluid initially for Mycobacterium tuberculosis when clinically suspected

- *Contraindications for lumbar puncture*

  - *Signs of raised intracranial pressure (ICP)*
  - *GCS of ≤8*
  - *Deteriorating Glasgow Coma Score (GCS)*
  - *Focal neurological signs*
  - *A convulsion lasting >10 min with a GCS of ≤12*
  - *Shock*
  - *Clinical evidence of systemic meningococcal disease*
  - *CT or MRI scan suggesting blockage or impairment of the cerebrospinal fluid pathways*

- *Be aware, a normal CT scan does not exclude raised intracranial pressure and should not influence the decision to perform a lumbar puncture if other contraindications are present.*

- *Be aware, the decision to perform a lumbar puncture in a child with a decreased conscious level should be made by an experienced paediatrician or consultant with paediatric experience who has examined the child.*

- Consider carrying out an urgent CT or MRI scan when the child is stable if the working diagnosis is:
  - Raised ICP
  - Intracranial abscess
  - Cause unknown

- Consider performing a cranial MRI scan within 48 hours if possible, if not carried out at presentation, if the diagnosis is still uncertain.

3.8 Managing the causes of decreased conscious level in children

- Consider starting concurrent management strategies in a child with a decreased conscious level to treat the potential different causes, whilst waiting for test results to confirm the most likely diagnosis.

3.9 Circulatory Shock

- Consider circulatory compromise and refer for further investigations if one or more of the following are present in a child with a decreased conscious level:
    - Mottled, cool extremities
    - Diminished peripheral pulses
    - Systolic blood pressure is less than 5th percentile for age
    - Decreased urine output less than 1 ml/kg/hour

  For further information on management of shock, please treat as per APLS guideline.

3.10. Sepsis

- Sepsis should be suspected and treated in a child with a decreased conscious level if two or more of the following four are present:
    - A body temperature of greater than 38°C or less than 36°C*
    - Tachycardia
    - Tachypnoea
    - A white cell count greater than 12x109 /L or less than 4x109 /L or if there is a non-blanching petechial or purpuric skin rash*

- For further information on investigations and management of sepsis, please refer to Sepsis UHL Childrens Hospital Guideline.

3.11. Trauma

- Examine a child with decreased conscious level for evidence of trauma from a collapse and request the core investigations to detect any underlying medical cause.

- Manage a child with a decreased conscious level and evidence of trauma according to Advanced Paediatric Life Support and the NICE Head Injury Guidelines https://www.nice.org.uk/guidance/cg176

3.12. Metabolic illness

3.12.1. Hypoglycaemia

Consider performing hypoglycaemia screen in a child with a laboratory glucose of less than 3 mmol/L and a decreased conscious level.

Please refer to UHL guideline Hypoglycaemia in Infants & Children (not for use in the NNU or for Children diagnosed with diabetes) for further investigations and management.

3.12.2. Diabetic ketoacidosis

For guidance on diabetic ketoacidosis please refer to Diabetic Ketoacidosis UHL Childrens Hospital Guideline.

3.12.3. Hyperammonaemia

Consider using a plasma ammonia threshold of >150 micromol/l in neonate and >100micromol/l to define abnormal levels. If a plasma level of >100micromol/l or higher is found discuss immediately with a metabolic expert.

Please refer to Hyperammonaemia UHL PICU Guideline for further investigations and management.

3.13. Intracranial infections

3.13.1. Bacterial meningitis

- Think about bacterial meningitis in children who present with one or more of the signs and symptoms detailed below:
- Non-blanching rash
- Stiff neck
- Altered mental state
- Shock
- Back rigidity
- Bulging fontanelle
- Photophobia
- Kerning's sign
- Brudzinski's sign
- Toxic/moribund state
- Paresis
- Focal neurological deficit including cranial nerve involvement and abnormal pupils sizes

For more detailed investigations and management, please refer to the Meningitis UHL Childrens Medical Guideline.

3.13.2. Viral Encephalitis

- Consider the possibility of viral encephalitis, including herpes simplex encephalitis (HSE), if a child with a decreased conscious level has one or more of the following:
    - Focal neurological signs

- Fluctuating conscious level, for 6 hours or more
- Previous contact with herpetic lesions
- A prolonged convulsion with no obvious precipitating cause
- No obvious clinical signs pointing towards the cause

- Confirm the clinical suspicion of herpes simplex encephalitis by a positive CSF PCR result for herpes simplex virus DNA.

- For more detailed investigations and management, please refer to the Viral Encephalitis UHL Childrens Medical Guideline.

3.13.3. Intracranial abscess

- Consider intracranial abscess in a child with a decreased conscious level if there are:
  - Focal neurological signs +/- signs of sepsis
  - Signs of raised intracranial pressure

- Perform Cranial imaging (CT) to diagnose an intracranial abscess acutely and consider doing MRI later on.

- Administer broad spectrum antibiotics after blood cultures have been taken, if an intracranial abscess is diagnosed in a child with a decreased conscious level.

- Obtain advice urgently from a paediatric neurosurgeon

3.13.4. Tuberculous Meningitis

- Consider tuberculous meningitis in a child with decreased conscious level if:
  - There has been contact with a case of pulmonary tuberculosis
  - The CSF opening pressure is high, the CSF is cloudy or yellow, contains slightly increased cells (less than 500), which are lymphocytes, with a low or very low CSF/plasma glucose ratio (less than 0.3), and a high or very high protein (1-5 g/L)

- Treat a child with suspected tuberculous meningitis according to the NICE Tuberculosis guideline

3.14. Raised Intracranial Pressure (ICP)

- For the recognition and management of raised intracranial pressure refer to the Meningitis UHL Childrens Medical Guideline.

- Consider requesting core investigations, and request urgent cranial imaging for a child with a decreased conscious level and suspected raised intracranial pressure, after the child's acute management has been discussed with paediatric intensive care

- Acute management of raised ICP includes:
    - Start resuscitation, ABC approach
    - Treat hypoglycaemia promptly and avoid hyperglycaemia
    - Give 3mls/kg of 2.7% sodium chloride or Mannitol (1gram/kg (5ml/kg) of 20% Mannitol over 15-30 minutes)
    - Treat shock if present cautiously, avoid hypotension, if present treat aggressively
    - Maintain a normal temperature, avoid hyperthermia
    - Elevate head to 30° in midline position
    - Neuro observation every 15 minutes
    - Consider sedation, intubation and ventilation to maintain the PaCO2 between 4.5 and 5.0 kPa in a child with a clinical diagnosis of raised intracranial pressure, before imaging.
    -
- Whilst treating a child with a confirmed diagnosis of raised intracranial pressure:
    - Avoid inserting central venous lines in the neck
    - Maintenance fluids should not be hypotonic (maintenance fluids need to be agreed at a local level)

3.15. Hypertensive encephalopathy

- Consider the following in a child with hypertension and a decreased conscious level:
    - Signs of raised intracranial pressure
    - Papilloedema and check four limb blood pressure

- Seek urgent help from a paediatric nephrologist or Intensivist when presented with a child with hypertension and no other cause for decreased conscious level

3.16. Prolonged convulsion

- Follow the APLS and Status Epilepticus UHL Childrens Medical Guideline to treat a child with a prolonged convulsion (i.e. lasting longer than five minutes)

- Consider performing core investigations at first clinical assessment in a child with a prolonged convulsion (i.e. lasting longer than five minutes) who is not known to have epilepsy.

- In addition to checking the core investigation, consider checking the plasma calcium and magnesium levels when a child presents with a prolonged convulsion (i.e. lasting longer than five minutes)

- Consider discussing treatment with a paediatric intensivist if a child has:
    - plasma sodium level less than 125 mmol/l
    - ionized calcium level less than 0.75 mmol/l or plasma calcium level less than 1.7 mmol/l
    - a plasma magnesium level less than 0.65 mmol/l and the convulsion is ongoing despite anticonvulsant treatment

3.17. Post-convulsive state

- Reassess a child following a convulsion if they have not awoken from the post-convulsive state within one hour.

3.18. Alcohol intoxication

- Consider carrying out a blood alcohol test in a child with a decreased conscious level with suspected alcohol intoxication

- Consider the need to treat the following in a child with a decreased conscious level and suspected alcohol intoxication:
    - Hypoglycaemia with intravenous (IV) glucose and maintenance dextrose/saline
    - Respiratory failure and or aspiration pneumonia
    - Hypotension
    - Other drugs ingested at the same time, e.g. opiates, or benzodiazepines, or paracetamol
- Avoid emetics (in case of aspiration)

- Consider identifying all likely substances or drugs that may be contributing to the child's decreased conscious level and call your local regional poisons unit for advice

3.19. Cause unclear

- Consider performing additional tests in discussion with a specialist (e.g. neurologist or metabolic expert depending on the clinical picture) after reviewing core investigations if the cause of decreased conscious level remains unknown. The additional tests are:
    - Cranial CT or MRI scan
    - Lumbar puncture
    - Urine toxicology
    - Urine organic and plasma aminoacids
    - Plasma lactate

- Consider performing an electro-encephalogram (EEG) after reviewing core investigations, CT or MRI scan results or initial CSF results.

- The following other conditions which could be considered in the differential diagnosis:
    - **Deliberate harm/injury** (safeguarding concerns) e.g. shaking
    - **Overdose**
        - sedation/anaesthesia/analgesia (including unusual reactions)
        - Carbon monoxide
    - **Hashimoto Encephalopathy**: suggest check thyroid antibiotics and thyroid function tests.

3.20. Good practice points

- During resuscitation and initial management of a child with a decreased conscious level, the parents/carers should be:
    - allowed to stay with the child if they wish
    - kept informed of the possible underlying diagnoses and treatments required
    - kept informed of the possible prognosis of their child if it is known.

4. Education and Training

No new training to implement this guideline identified

5. Monitoring Compliance

What will be measured to monitor compliance	How will compliance be monitored	Monitoring Lead	Frequency	Reporting arrangements
-Initial monitoring and observation -history point -core investigation -Treating core symptoms	Audit	Paediatric Consultant	Annually	Local departmental clinical practice group

6. Supporting Documents and Key References

For quick reference please click on the following link to access the RCPCH guidance for management of children with an acute decrease in conscious level and for latest resuscitation council guidelines on paediatric advanced life support.

https://www.rcpch.ac.uk/resources/management-children-young-people-acute-decrease-conscious-level-clinical-guideline

https://www.resus.org.uk/library/2021-resuscitation-guidelines/paediatric-advanced-life-support-guidelines

7. Key Words

Decreased conscious level, Alert, Voice, Pain, Unresponsive Scale (AVPU), Glasgow Coma Score (GCS)

The Trust recognises the diversity of the local community it serves. Our aim therefore is to provide a safe environment free from discrimination and treat all individuals fairly with dignity and appropriately according to their needs.
As part of its development, this policy and its impact on equality have been reviewed and no detriment was identified.

Contact and review details			
Guideline Lead (Name and Title) Original author: H Salleh – Specialist Registrar			**Executive Lead** Chief medical officer
Details of Changes made during review:			
Date	**Issue Number**	**Reviewed By**	**Description Of Changes (If Any)**
Sept 2022	2	Dr Krishna Shetye & Dr Nahin Hussain Approved by UHL Children's Hospital clinical guidelines group	1. In management algorithm, the fluid bolus is now changed to 10ml/kg and reassess for all patients even in septic shock. The BSPED guidelines for DKA also recommend giving aliquots of 10ml/kg rather than 20ml/kg. 2. Contraindications of Lumbar Puncture added in section 3.7. 3. The Lower limit for temperature for sepsis changed to 36 from 35.5 in section 3.10