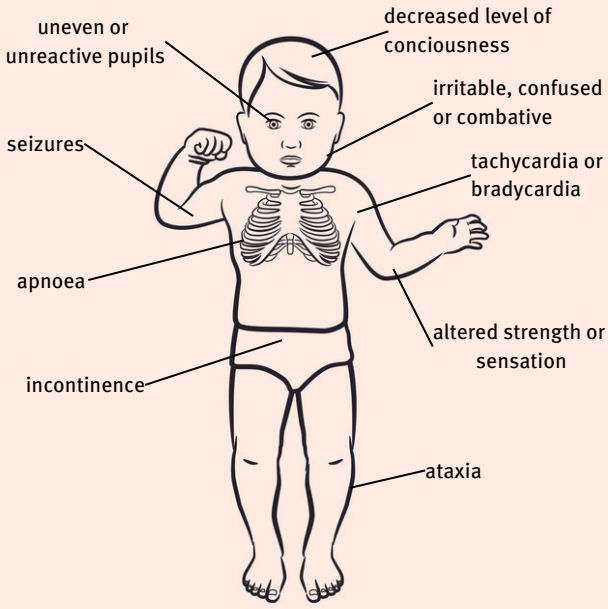
Queensland Paediatric Emergency Care

Skill Sheets

Neurological Assessment

Neurological assessment is required in many children who present to the emergency department. Some indications include head trauma, seizures, confusion, headache, altered behaviour or any other concerns for neurological changes. The method of obtaining the information required to complete a paediatric neurological assessment differs according to the child's age, neurodevelopment and language level. Much of this document is based upon the CHQ Nursing Standard: Clinical Observations - Considerations in Children.

Common signs of neurological compromise

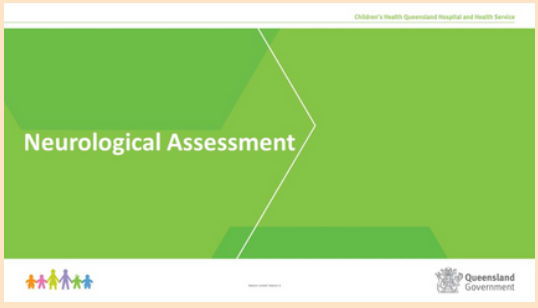


NB: This list is not exhaustive.

ALERT

Deterioration in neurological status should be reported immediately to a senior clinician. Changes can be subtle in children and even small changes should be taken seriously.

Video Demonstration:



Key aspects of this skill sheet are demonstrated in the QPEC Neurological Assessment Video (7 mins).

AVPU (Alert/Voice/Pain/Unresponsive) Scale / Behaviour

The AVPU scale is used to rapidly check a child's neurological status. The scale is described below:

A Alert – the infant or child is awake

V Voice – the infant or child responds to a verbal stimulus

P Pain – the infant or child responds to painful stimulus

U Unresponsive – the infant or child is unresponsive to stimulus

Behaviour

- Changes in behaviour, confusion, drowsiness without explanation
- level of awareness / interaction
- appropriate response to stimulus / environment
- any indication of unexplained irritability / drowsiness
- headache / dizziness / photophobia

Any deviation from expected requires a more comprehensive assessment - Glasgow Coma Scale.
A sudden onset of neurological changes requires urgent medical review.

Glasgow Coma Scale

The Glasgow Coma Scale (GCS) is a standard tool used to assess neurological status. The Children's Glasgow Coma Scale should be used for all children under 4 years of age. For non-verbal children, the grimace response is assessed instead of verbal response. Please refer to the CHQ Nursing Standard: Clinical Observations - Considerations in Children for more information.

Eye Opening

Auditory stimuli should be the first stimuli used to elicit a response. Where a response is given with auditory stimuli, move on to the verbal response component of the GCS. Where there is no response with auditory stimuli, gentle tactile stimuli should be attempted (eg. touching patient's arm whilst calling their name). If there is still no response, a painful central stimuli should be applied (eg. trapezius squeeze).

Verbal Response

The method to assess of a verbal response will depend on the age and development of the child.

Best verbal response (<4 years)		Best verbal response (>4 years)		Best grimace response (non-verbal)	
Alert; babbles, coos words to usual ability	5	Oriented and converses	5	Spontaneous normal facial / oro-motor activity	5
Less than usual words, spontaneous irritable cry	4	Disoriented and converses	4	Less than usual spontaneous ability or only response to touch stimuli	4
Cries only to pain	3	Inappropriate words	3	Vigorous grimace to pain	3
Moans to pain	2	Incomprehensible sounds	2	Mild grimace to pain	2
No response to pain	1	No response to pain	1	No response to pain	1

Glasgow Coma Scale (continued)

Best Motor Response

- In the unconscious patient, muscle strength can be assessed through observation of spontaneous movement, if there is none, painful stimuli should be applied, and response noted.
- In the conscious patient muscle strength is assessed by active and passive resistive movements. Strategies to assess may include asking the child to give a "high five" with both hands and getting them to push against the nurse's hands with their feet. Take note of strength, symmetry and tone.
- In ambulatory children getting them to heel and toe walk, climb into bed, write their name, are other examples which will help to get an accurate motor assessment. Resistance to movement during passive exercises is another measure of motor response.
- Asymmetric or absent movements suggest paralysis.

Best motor response (‹4 years)		Best motor response (›4 years)	
Spontaneous or obeys verbal commands	6	Obeys verbal commands	6
Localises to pain or withdraws to touch	5	Localises to pain	5
Withdraws from pain	4	Withdraws from pain	4
Abnormal flexion to pain (decorticate)	3	Abnormal flexion to pain (decorticate)	3
Abnormal extension to pain (decerebrate)	2	Abnormal extension to pain (decerebrate)	2
No response to pain	1	No response to pain	1

Interpreting the score

The score for each area should be the best response elicited at the time.

- A score of 15 means the patient is fully alert and orientated.
- A score of 8 or less means the patient has a significantly decreased level of consciousness. Airway support is likely to be needed.
- Unresponsiveness in the absence of other neurologically altering factors such as hypoxia, electrolyte imbalances, hypothermia, and sedation means severe coma that may lead to death.
- When describing GCS, it is helpful to break down the score into the EVM components.

The GCS score only reflects the patient's status at the time of assessment. If the patient's condition is changing a GCS assessment should be repeated to facilitate early detection of further deterioration.

Pupil Assessment

Pupil size should be recorded prior to shining the light in the eye. Equal reaction to light is best assessed by shining a torch light at the mid-forehead area. A specialised neurological (small) torch should be used. Pupillary changes usually occur on the same side as the lesion / impairment, unlike motor changes which affect the opposite side of the body.

There are four important parts to assessing pupils using the CAVE method:

C Check for reaction
A Assess the size
V Verify for consensuality (the opposite pupil responds in the same way as the pupil receiving the direct light stimulus)
E Examine the shape

ALERT

The sudden appearance of a fixed dilated pupil is a neurological emergency. If a pupil that has previously been reactive to light is assessed as becoming sluggish and increasing in size, this may be evidence that intracranial pressure (ICP) is rising and immediate medical review and intervention should be initiated.

Checking Fontanelles

The posterior (back) fontanelle usually closes by the second month of life and the anterior (top) fontanelle fuses between 12-18 months.

How to assess:

- When assessing the fontanelles ensure the baby is settled and is either held or positioned sitting upright. These fontanelles should feel flat, firm and well distinguished against the bony edges of the skull.

ALERT

A bulging fontanelle can indicate increased intracranial pressure. A sunken fontanelle can indicate dehydration. A senior medical officer should be notifed of these findings promptly.

Head Circumference

Head circumference should be measured in all children aged two years and under. Head circumference should be measured on admission and at least monthly until the age of two. A flexible, non-stretchable measuring tape or disposable paper tape, 0.5-1cm in width and able to measure in 0.1cm increments is to be used for measurement of head circumference. Record head circumference to nearest 0.1cm.

1

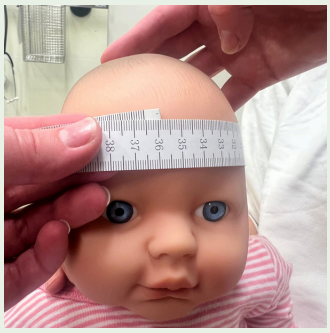
Ask the parent or caregiver to assist by holding the infant's head steady whilst sitting up and provide comfort to the infant. If poor head control, measure with infant lying down.

2

Remove any hats or headbands. Place the tape evenly around the head anchoring it just above the ears and eyebrows and around the fullest protuberance (largest circumference) of the skull at the back at the back of the child's head.

3

Gently pull the tape so it fits snugly against the infant's skull, compressing the hair and skin.



For further information:

Skill Sheets:
Obtaining Observations in Children

References:

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This Queensland Paediatric Emergency Skill Sheet was developed and revised by the Emergency Care of Children working group.
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Skill Sheet Disclaimer