



Paediatric Intensive Care Unit Nursing Guideline: Brain Stem Death

Brain stem death (BSD) is defined as “the irreversible loss of capacity for consciousness combined with the irreversible loss of capacity to breathe” (Department of Health, 1998).

The functions of the brain stem include the control of cardiac and respiratory function and consciousness. Thus, once the brain stem has been irreversibly destroyed, death of the individual has occurred and the heart will inevitably stop beating (Academy of Medical Royal Colleges, 2008). Cessation of heart beat may take days, weeks or months if aggressive treatment continues.

Brain stem death testing tests for:

1. Absence of consciousness and
2. Inability to breathe

As a nurse caring for a child with suspected brain stem death, you must be aware of the process so that you can support the family. You should also ensure that the child continues to receive a high standard of nursing care to promote his/her comfort and dignity and that normal homeostasis is maintained until death has been conclusively established.

You should be mindful that it is lawful to withdraw care in any child if continued treatment is considered futile and satisfactory consent has been obtained even if they do not fulfil brain stem death criteria (Royal College of Paediatrics and Child Health, 2004)

Preconditions for Brain Stem Death Testing:

1. There must be an identifiable diagnosis (intra- or extra-cranial) causing irremediable brain damage.
2. The patient must be deeply unconscious.
 - i. Hypothermia must be excluded – core temperature > 34°C.
 - ii. There should be no evidence that the patient's status is due to depressant drugs (narcotics, hypnotics, tranquillisers) or muscle relaxants.
 - iii. Potentially reversible circulatory, metabolic and endocrine disturbances must have been excluded.
3. The patient must be apnoeic needing mechanical ventilation.

Brain Stem Death Testing

The test must be carried out by 2 doctors who have held full registration with the GMC for > 5 years; at least one should be a paediatrician, one should be a consultant, and one should not be primarily involved in the child's care.

Two sets of tests should be carried out to reduce the risk of observer error. There are no guidelines relating to the time distance between the tests – it is not uncommon for them to be performed back-to-back.

The legal time of death is when the first test indicates death due to the absence of brain stem reflexes, but death is not confirmed until the second test has been completed.

The rules for BSD testing apply to children over the age of 2 months. From 37 weeks gestation to 2 months it is rarely possible to confidently diagnose BSD. BSD testing cannot be applied if < 37 weeks gestational age.

Brain Stem Death Criteria

	The Test	How?	CN
1	Pupils fixed in diameter and unresponsive to incident light	Assessed with bright pen torch or otoscope light	II,III
2	Absent corneal reflex	Cotton wool/bud touched to cornea	V,VII
3	Absent vestibulo-ocular reflex	Up to 50 mls ice-cold water injected into each external auditory meatus*. (Access to tympanic membrane is confirmed by otoscopy)	III VI VIII
4	Absent motor response/limb movement	Stimulation of either head/neck area or body area (i.e. central stimulus)	V, VII
5	Absent gag reflex or cough reflex response to bronchial stimulation	Posterior pharyngeal wall stimulated with spatula or suction catheter placed down the trachea to carina.	IX, X
6	No respiratory movement when disconnected from the ventilator	Prevent hypoxia: pre-oxygenate, pass suction catheter down ETT with 5-6L/min O ₂ flowing or with a re-breathe circuit connected to deliver oxygen and some CPAP. ABG taken to confirm PaCO ₂ > 6.65 KPa.	

CN = cranial nerve

* Normal response is deviation of the eyes away from the stimulus.

Equipment for Testing

Documentation: 'Procedure for the diagnosis of and confirmation of cessation of brain-stem function by neurological testing of brain-stem function' (see appendix)

Pen torch

Otoscope (kept in CD cupboard)

Spatulas

Cotton wool ball or cotton buds

50ml syringe x 2 (or 20ml syringe x 4) plus quill

Ice (available from theatres) – need minimum of 100ml iced water

Incontinence pad (placed under head)

Kidney bowls (to collect iced water)

Suction catheters of appropriate size

Ayres T-piece *or* white connector (as used for NBBALs) & green oxygen tubing if used suction catheter to deliver O₂

Equipment for taking a minimum of 4 arterial blood gases.

Family

The child's family will need a lot of support through this time. The parents/carers should be kept fully informed of the child's condition and prognosis (Baines, 2005). The possibility of organ donation should be introduced to the parents/carers early and they should be introduced to the transplant coordinators. Discussions may also need to include religious advisors.

The parents/carers may want to witness the tests. This may help them accept that death has occurred and help with the grieving process (Brierley, 2010). If they wish to be present for the testing they will need someone to stay with them and explain what is happening. They will need explanations of:

- The concept of brain stem death (see AORMC, 2008, appendix 5)

- Each individual test and its significance
- Reflex movements of the torso and limbs – these are caused by spinal reflexes and do not represent higher functioning of the brain (according to Brierley (2010))

Once brainstem death has been established the family should be given the opportunity to say their goodbyes. Treatment may then be withdrawn; or if organ donation is to proceed, the priority becomes preserving and optimising the potential transplantable organs.

Explanation of spinal movements to healthcare professionals:

The illustration of a decapitated chicken that is still able to run around for a bit can be helpful as this movement does not involve the brain at all (Brierley, 2010).

Do not use this analogy for relatives.

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References

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(Includes an easy to understand explanation of brain stem death in appendix 5).

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