

Documentation of neurological determination of death

Dr Nilesh Parekh
Consultant and RCLOD
QEHB



DNDD

Preparation

1. Evidence for Irreversible Brain Damage of known Aetiology

Case records, past medical history including possibly contacting the GP, relevant imaging.

2. Exclusion of Reversible Causes of Coma and Apnoea

Standard ICU cardio-respiratory monitoring (to ensure haemodynamic stability), medication chart and history, blood and urine drug assay results (where relevant), drug antagonists (e.g. flumazenil, naloxone), peripheral nerve stimulator, recent serum glucose and biochemistry, thermometer, patient warming device.

3. Tests for Absence of Brain-Stem Function

Brain-stem reflexes

Bright light source; small gauze sterile swabs, otoscope with disposable ear pieces, 50 ml luer lock syringe and disposable quill, ice-cold water; a spatula, Yankauer sucker or laryngoscope, endotracheal suction catheters.

Apnoea test

Haemodynamic monitoring (continuous ECG, invasive arterial pressure), arterial blood gas analysis including blood gas syringes x4, pulse oximetry and end-tidal CO₂ monitoring, means of delivering oxygen to the trachea by bulk flow (e.g. Mapleson B circuit which allows CPAP or endotracheal suction catheter and oxygen tubing).



Tests for Absence of Brain-Stem Function

Preparation for the Apnoea Test

- Oxygenation and cardiovascular stability should be maintained through each apnoea test. Pre-oxygenate FiO_2 1.0.
- Allow PaCO_2 to rise to at least 6.0 kPa by reducing the minute ventilation prior to commencing the apnoea test. End tidal carbon dioxide can be used to guide the starting of each apnoea test but should not replace the pre and post arterial PaCO_2 .
- Cardiac pulsation may be sufficient to trigger supportive breaths if the patient remains connected to the mechanical ventilator and on a spontaneous breathing mode. Performing the apnoea test whilst remaining on mechanical ventilation is not recommended.

Guidance

Recommended methods:

- CPAP circuit (eg Mapleson B), especially if oxygenation is a problem, or
- Disconnect the patient from the ventilator and administer oxygen via a catheter in the trachea at a rate of $>6\text{L/minute}$.



	1 st Test		2 nd Test	
Arterial Blood Gas PRE apnoea test: Confirm PaCO ₂ is at least 6.0 kPa but not substantially greater. In patients with chronic CO ₂ retention, or those who have received intravenous bicarbonate, it recommended that PaCO ₂ is allowed to rise to above 6.5 kPa.	1st Test Starting paCO ₂ : kPa Should be ≥6.0 kPa		2nd Test Starting paCO ₂ : kPa Should be ≥6.0 kPa	
PRE Arterial Blood Gas pH/[H⁺]: Confirm pH < 7.4 or [H ⁺] >40 nmoles/L.	pH= Should be < 7.4 [H ⁺]= Should be >40nmoles/L		pH= Should be < 7.4 [H ⁺]= Should be >40nmoles/L	
Start time: Time when apnoea test was commenced.	hr : min (24 hour clock)		hr : min (24 hour clock)	
Arterial Blood Gas POST apnoea test: Ensure the PaCO ₂ has increased by greater than 0.5 kPa.	1st Test Stopping paCO ₂ : kPa Should have increased by > 0.5		2nd Test Stopping paCO ₂ : kPa Should have increased by > 0.5	
Stop time: Time when apnoea test was ceased.	hr : min (24 hour clock) <i>Perform lung recruitment</i>		hr : min (24 hour clock) <i>Perform lung recruitment</i>	
Was there any spontaneous respiration during a minimum of 5 (five) minutes continuous observation following disconnection from the ventilator? (To diagnose death using neurological criteria, ALL answers should be NO)	Dr One Yes / No	Dr Two Yes / No	Dr One Yes / No	Dr Two Yes / No



FICM vs AoMRC

Form for the Diagnosis of Death using Neurological Criteria {full guidance version}

This form is consistent with and should be used in conjunction with, the AoMRC (2009) *A Code of Practice for the Diagnosis and Confirmation of Death* and has been endorsed for use by the following institutions: Faculty of Intensive Care Medicine, Intensive Care Society and the National Organ Donation Committee.

HOSPITAL ADDRESSOGRAPH

Surname
First Name
Date of Birth
NHS Number

Objective of Care

- To diagnose and confirm the death of a mechanically ventilated, severely brain injured patient in coma, using neurological criteria.

Academy of the Medical Royal Colleges Definition of Human Death (2008):²

"Death entails the irreversible loss of those essential characteristics which are necessary to the existence of a living human person and, thus, the definition of death should be regarded as the irreversible loss of the capacity for consciousness, combined with irreversible loss of the capacity to breathe. The irreversible cessation of brain-stem function whether induced by intra-cranial events or the result of extra-cranial phenomena, such as hypoxia, will produce this clinical state and therefore irreversible cessation of the integrative function of the brain-stem equates with the death of the individual and allows the medical practitioner to diagnose death."

Context

- National professional guidance advocates the confirmation of death by neurological criteria wherever this seems a likely diagnosis and regardless of the likelihood of organ donation.³
- UK General Medical Council (GMC) guidance on end of life care (2010) states that national procedures for identifying potential organ donors should be followed and, in appropriate cases, the specialist nurse for organ donation (SN-OD) should be notified.³ NICE guidance recommends that the specialist nurse for organ donation (SN-OD) should be notified at the point when the clinical team declare the intention to perform brain-stem death tests.⁴

Date and time of referral to SN-OD:

- Whilst most patients will already be in an Intensive Care Unit (ICU) when the diagnosis is suspected, some patients may be in other areas, e.g. the Emergency Department. On such occasions it is legitimate, if considered necessary, to transfer a patient to the ICU for the diagnosis to be made.

For medical and legal purposes the diagnosis and confirmation of death using neurological criteria will be a

APPENDIX 1

PROCEDURE FOR THE DIAGNOSIS AND CONFIRMATION OF CESSATION OF BRAIN-STEM FUNCTION BY NEUROLOGICAL TESTING OF BRAIN-STEM REFLEXES

Diagnosis is to be made by two doctors who have been registered for more than five years and are competent in the procedure. At least one should be a consultant. Testing should be undertaken by the doctors together and must always be performed completely and successfully on two occasions in total.

Patient Name: Unit No:

Pre-conditions

Are you satisfied that this patient suffers from a condition that has led to irreversible brain damage?

Specify the condition:

Dr A: Dr B:

Time of onset of unresponsive coma:

Dr A: Dr B:

Are you satisfied that potentially reversible causes for the patient's condition have been adequately excluded, in particular:

	DR A:	DR B:
DEPRESSANT DRUGS		
NEUROMUSCULAR BLOCKING DRUGS		
HYPOTHERMIA		
METABOLIC OR ENDOCRINE DISTURBANCES		

TESTS FOR ABSENCE OF BRAIN-STEM FUNCTION	1 ST SET OF TESTS	2 ND SET OF TESTS	1 ST SET OF TESTS	2 ND SET OF TESTS
DO THE PUPILS REACT TO LIGHT?				
ARE THERE CORNEAL REFLEXES?				
IS THERE EYE MOVEMENT ON CALORIC TESTING?				
ARE THERE MOTOR RESPONSES IN THE CRANIAL NERVE DISTRIBUTION IN RESPONSE TO STIMULATION OF FACE, LIMBS OR TRUNK?				
IS THE GAG REFLEX PRESENT?				
UNRESPONSIVE TO STIMULATION FOR				



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ICS & Other

Appendix 1

Proforma for documentation of brain stem tests

Diagnosis is to be made by two doctors who have been registered for more than five years and are competent in the procedure. At least one should be a consultant. The two doctors may carry out the tests separately or together. Two sets of tests must always be performed.

Name: _____ Unit No: _____

Pre-Conditions

Are you satisfied that the patient suffers from a condition that has led to irremediable brain damage?

Specify the condition:

Dr A: _____ Dr B: _____

Time of onset of unresponsive coma:

Dr A: _____ Dr B: _____

Are you satisfied that potentially reversible causes for the patient's condition have been adequately excluded, in particular:

	Dr A	Dr B
Depressant drugs		
Neuromuscular blocking drugs		
Hypothermia		
Metabolic or endocrine disturbances		

Tests for absence of brain stem function	Dr A		Dr B	
	1st Testing	2nd Testing	1st Testing	2nd Testing
Do the pupils react to light?				
Are there corneal reflexes?				
Is there eye movement on caloric testing?				
Are there motor responses in the cranial nerve distribution in response to stimulation of face, limbs or trunk?				
Is there a gag reflex?				
Is there a cough reflex?				
Have the recommendations concerning testing for apnoea been followed?				
Were there any respiratory movements seen?				

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Date and time of first testing: _____

Date and time of second testing: _____

Dr A Signature: _____ Dr B Signature: _____

Status: _____ Status: _____

Name: _____

Address: _____

Date of birth: _____

Condition which led to irremediable brain damage: _____

Onset of apnoeic coma; Date: _____ Time: _____

PRECONDITIONS; is apnoeic coma due to any of the following?

	Assessment A		Assessment B	
	Yes	No	Yes	No
Depressant drugs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Neuromuscular blocking drugs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hypothermia	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Metabolic causes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Endocrine disturbance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

CLINICAL TESTS OF BRAIN STEM FUNCTION:

	Assessment A		Assessment B	
	Yes	No	Yes	No
Is there a motor response to painful stimulus in cranial nerve distribution?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do the pupils react to light?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are corneal reflexes present?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do the eyes move on caloric testing?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is there a gag reflex?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is there a cough reflex?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Were there respiratory movements during apnoea testing?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PaCO ₂ pre and post apnoea test;	Pre <input type="checkbox"/> Post <input type="checkbox"/>		Pre <input type="checkbox"/> Post <input type="checkbox"/>	
pH pre and post apnoea test;	Pre <input type="checkbox"/> Post <input type="checkbox"/>		Pre <input type="checkbox"/> Post <input type="checkbox"/>	

Date and time of tests: Assessment A: _____ Assessment B: _____

Assessor(s) A

Assessor(s) B

Name(s)

Grade

Signature

Confirmation of brain death

Do the above tests confirm brain death? Yes ☐ No ☐

Date of death: _____ Time of death: _____

Name: _____ Signature: _____ Grade: _____



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Confusion

Tests for Absence of Brain-Stem Function

	1 st Test Dr One Examining	1 st Test Dr Two Observing	2 nd Test Dr One Observing	2 nd Test Dr Two Examining
Do the pupils react to light?	Yes / No	Yes / No	Yes / No	Yes / No
Is there any eyelid movement when each cornea is touched in turn?	Yes / No	Yes / No	Yes / No	Yes / No
Is there any eye movement during or following caloric testing in each ear?	Yes / No	Yes / No	Yes / No	Yes / No
Is there any motor response when supraorbital pressure is applied?	Yes / No	Yes / No	Yes / No	Yes / No
Is the gag reflex present?	Yes / No	Yes / No	Yes / No	Yes / No
Is the cough reflex present?	Yes / No	Yes / No	Yes / No	Yes / No
Arterial Blood Gas pre apnoea test check: (Starting $\text{paCO}_2 \geq 6.0$ kPa and starting $\text{pH} < 7.4$ or $[\text{H}^+] > 40$ nmoles/L)	1 st Test Starting paCO_2 : Starting $\text{pH}/[\text{H}^+]$:		2 nd Test Starting paCO_2 : Starting $\text{pH}/[\text{H}^+]$:	
Is there any spontaneous respiration within 5 (five) minutes following disconnection from the ventilator?	Yes / No	Yes / No	Yes / No	Yes / No
Arterial Blood Gas Result post apnoea test: (paCO_2 rise should be > 0.5 kPa)	1 st Test Final paCO_2 : <i>Perform lung recruitment</i>		2 nd Test Final paCO_2 : <i>Perform lung recruitment</i>	

TESTS FOR ABSENCE OF BRAIN-STEM FUNCTION	1 ST SET OF TESTS
DO THE PUPILS REACT TO LIGHT?	NO
ARE THERE CORNEAL REFLEXES?	NO
IS THERE EYE MOVEMENT ON CALORIC TESTING?	NO
ARE THERE MOTOR RESPONSES IN THE CRANIAL NERVE DISTRIBUTION IN RESPONSE TO STIMULATION OF FACE, LIMBS OR TRUNK?	NO
IS THE GAG REFLEX PRESENT?	NO
IS THERE A COUGH REFLEX?	NO
HAVE THE RECOMMENDATIONS CONCERNING TESTING FOR APNOEA BEEN FOLLOWED?	YES
WERE THERE ANY RESPIRATORY MOVEMENTS SEEN?	NO

