Form for the Diagnosis of Death using Neurological Criteria

This form is consistent with and should be used in conjunction with, the AoMRC 2025 Update *A Code of Practice for the Diagnosis and Confirmation of Death (Code).*
Endorsed for use by: Faculty of Intensive Care Medicine, Intensive Care Society, Northern Ireland Intensive Care Society, Scottish Intensive Care Society, Welsh Intensive Care Society.

Only the latest version of this form must be used – found at www.ficm.ac.uk – including if the form has been transcribed for use into an electronic health record.

HOSPITAL ADDRESSOGRAPH or

Surname
First Name
Date of Birth
NHS / CHI Number

This form is for use in adults and children older than 2-years

Preparation

1. Patient selection

- A patient following devastating brain injury who remains deeply comatose (GCS 3/15), has no observed brainstem reflexes and is apnoeic requiring mechanical ventilation but in whom circulation and other bodily functions persist. (Code 6.2)
- This form is applicable for use in adults and children older than than 2-years corrected age post term. For children younger than 2-years, additional diagnostic caveats are required – use Infant Testing Form. (Code 6.38, Appendix 2)
- Families should ideally be offered the opportunity to observe a set of clinical tests to confirm death. Often, the second set of tests is the most appropriate and useful for families to witness. (Code 6.9)
- *Patients requiring extracorporeal membrane oxygenation (ECMO):* Guidance to supplement the 2008 Code for patients on ECMO has been previously published and remain valid. (Code 6.68)

2. Who can use neurological criteria? (Code 6.6-6.12)

- The diagnosis of Death using Neurological Criteria (DNC) should be made by at least two doctors who have had full registration with the General Medical Council (GMC) – or equivalent international professional body recognised by the GMC – for more than 5 years and are competent to diagnose and confirm death using neurological criteria in the UK. At least one of the doctors must be a consultant.
- The two doctors work together to perform a full set of clinical tests but each doctor independently ensures that the diagnosis is carried out in an accurate, standardised and timely manner. The clinical tests are then repeated. Where required, four different doctors can make the diagnosis *provided each pair fulfils the requirements above.*
- Those diagnosing and confirming death should not be acting on behalf of the organ retrieval and transplant service at that time and must not be involved in the allocation of any of the patient's organs or tissues that may subsequently be donated for transplantation.
- Clinical Leads for Organ Donation can be one of the two doctors and are likely to have significant expertise. Intensivists or anaesthetists can diagnose DNC and still assist in organ retrieval or in caring for patients post transplant provided they have no role in organ allocation for that patient and are not part of the duty transplant service at that time.

3. Equipment (Code 6.42-6.48)

- *Preconditions:* Case records, medication chart, blood results including phosphate, magnesium, recent blood glucose; relevant imaging; standard ICU monitoring including end-tidal CO_2; peripheral nerve stimulator; thermometer; patient warming device.
- *Clinical testing of brainstem reflexes:* Bright light source and/or pupilometer; small gauze sterile swabs; otoscope with disposable ear pieces, ice-cold water, 50 ml syringe, disposable quill (or equivalent) if needed; tongue depressor or firm suction catheter (e.g. Yankauer sucker), laryngoscope or video laryngoscope; endotracheal suction catheter.
- *Apnoea test:* Arterial blood gas analysis including at least 4 blood gas syringes, CPAP circuit (e.g. Mapleson C or equivalent).

4. Ancillary Investigations (Form Page 5, Code 6.54-6.67, Appendix 2, A9)

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Patient Name: **NHS / CHI Number:**

Precondition 1
Aetiology severe enough to cause permanent cessation of brainstem function

Guidance (Code 6.2, 6.14 – 6.20)

1.1 The patient must have a devastating brain injury of known aetiology or mechanism, Glasgow Coma Score of 3, no observed brainstem reflexes and be mechanically ventilated with apnoea.

1.2 The nature and severity of the devastating brain injury must be sufficient to cause permanent cessation of brainstem function. This evaluation must include neuroimaging but might also include electrophysiological or invasive intracranial pressure measurements. (Code 6.14, 6.15)

1.3 The doctors must be satisfied that there are no further appropriate therapeutic options which would benefit the patient. (Code 6.16)

Aetiology:

Neuroimaging (and any other evidence):

	Test 1		Test 2	
Precondition 1 **Is the aetiology severe enough to cause permanent cessation of brainstem function?** **(To diagnose death, answers must be YES)**	**Dr One** **Yes / No**	**Dr Two** **Yes / No**	**Dr One** **Yes / No**	**Dr Two** **Yes / No**

Precondition 2
Assessment period sufficient to exclude the potential for recovery

Guidance (Code 6.21 – 6.25)

2.1 The doctors must be satisfied that recovery or improvement of the patient's condition will not occur with the passage of time. (Code 6.21)

2.2 **Neurological criteria should not be applied until at least 6 hours** following the loss of the last observed brainstem reflex or spontaneous breath. Extend to **24 hours in cases of acute hypoxic-ischaemic encephalopathy or post cardiorespiratory arrest.** (Code 6.22,6.23)

2.3 **In patients who are hypothermic** (defined as a core temperature less than 36°C), either therapeutic or accidental, **a minimum 24 hour observation period is required** following correction of hypothermia (that is, attaining a core temperature of 36°C or greater). Following correction of hypothermia, transient and temporary reductions in temperature do not mandate a further 24 hour observation at normothermia. **The core temperature should be greater than or equal to 36°C at the time of clinical testing.** (Code 6.24, 6.27)

2.4 If there is uncertainty about the potential for recovery the observation time should be extended. If diagnostic uncertainties regarding potential recovery remain, the diagnosis cannot be made. (Code 6.25)

	Test 1		Test 2	
Precondition 2 **Is the assessment period sufficient to exclude the potential for recovery?** **(To diagnose death, answers must be YES)**	**Dr One** **Yes / No**	**Dr Two** **Yes / No**	**Dr One** **Yes / No**	**Dr Two** **Yes / No**

Precondition 1 and 2: ALL answers must be YES

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Patient Name: **NHS / CHI Number:**

Precondition 3
Exclusion of potentially reversible factors materially contributing to the coma or apnoea

Guidance (Code 6.26 – 6.34)

3.1 **Doctors applying neurological criteria must carefully exclude all the potentially reversible factors below and any other factors they consider might be materially contributing to the coma or apnoea.** 'Materially contributing' means a factor that is clinically impacting or confounding the diagnosis such that if that factor was removed there could potentially be brainstem function. If reversible factors cannot be excluded, the addition of an ancillary investigation will be necessary to support a diagnosis of DNC. (Code 6.26)

3.2 Patients with devastating brain injury should be considered as having a vulnerable brain which might be more sensitive to lower levels of **depressant drugs.** Carefully review the recent history of what drugs have been ingested or administered to exclude any possibility of ongoing drug effect being the cause of, or materially contributing to, the patient's coma or apnoea. If there is any doubt consider: predicting residual sedative effects according to pharmacokinetic principles, measuring specific drug levels where possible, gaining advice from the UK National Poisons Information Service or pharmacology/biochemistry specialists, using specific antagonists such as naloxone or flumazenil, or the addition of an ancillary investigation. (Code 6.28)

3.3 In patients where a **pre-existing or acquired neuromuscular disorder** is known or possible, careful consideration should be given to the impact of drug history and muscle function before applying neurological criteria. (Code 6.29)

3.4 If there are reasons to suspect that an underlying **high cervical cord pathology**, with or without associated cervical spine injury, is contributing to the apnoea, then further investigation will be needed. (Code 6.30)

	Test 1		Test 2	
ALL answers must be YES or can be mitigated	**Dr One**	**Dr Two**	**Dr One**	**Dr Two**
Hypothermia (Guidance 2.3) **Is the core temperature greater than or equal to 36°C?**	**Yes / No**	**Yes / No**	**Yes / No**	**Yes / No**
Depressant drugs (Guidance 3.2) **Are you satisfied that no ongoing drug effect is the cause of, or materially contributing to, the patient's coma or apnoea?**	**Yes / No**	**Yes / No**	**Yes / No**	**Yes / No**
Profound neuromuscular weakness (Guidance 3.3) **Are you satisfied that no neuromuscular blocking agent or other drug, or a pre-existing or acquired neuromuscular disorder, is contributing to apnoea or neuromuscular weakness?** *Confirm that adequate neuromuscular function is present by using a peripheral nerve stimulator or other recognised method.*	**Yes / No**	**Yes / No**	**Yes / No**	**Yes / No**
Cervical spinal cord pathology (Guidance 3.4) **Are you satisfied no further investigation is required to exclude high cervical spinal cord pathology?**	**Yes / No**	**Yes / No**	**Yes / No**	**Yes / No**
Circulatory and respiratory disturbances **Are you satisfied that no cardiovascular or respiratory disturbance is materially contributing to the observed coma or apnoea?** *Target normal (or patient baseline / age appropriate) parameters.*	**Yes / No**	**Yes / No**	**Yes / No**	**Yes / No**

Precondition 3: ALL answers must be YES or can be mitigated

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Patient Name: **NHS / CHI Number:**

Precondition 3 (continued)
Exclusion of potentially reversible factors materially contributing to the coma or apnoea

Electrolyte, metabolic and endocrine disturbances (Code 6.33 – 6.34)	**Test 1**	**Test 2**
Sodium (Na^+) is between 125-160 mmol/L, inclusive.	mmol/L	mmol/L
Potassium (K^+) is greater than 2.0 mmol/L.	mmol/L	mmol/L
Phosphate (PO_4^{3-}) is between 0.5 and 3.0 mmol/L, inclusive.	mmol/L	mmol/L
Magnesium (Mg^{2+}) is between 0.5 and 3.0 mmol/L, inclusive.	mmol/L	mmol/L
Blood glucose is between 3.0 and 20.0 mmol/L, inclusive. *As blood glucose concentrations can change rapidly in critically ill patients, a blood sugar measurement should be made prior to clinical testing.*	mmol/L	mmol/L

	Test 1		**Test 2**	
Other electrolyte and metabolic disturbances **Are you satisfied that no other electrolyte or metabolic disturbance is materially contributing to the coma or apnoea (e.g. elevated urea or ammonia, metabolic disorders)?** *In such situations either correction, expert metabolic advice, or ancillary investigation should be considered.*	**Dr One** **Yes / No**	**Dr Two** **Yes / No**	**Dr One** **Yes / No**	**Dr Two** **Yes / No**
Endocrine disturbances **Are you satisfied that there is no clinical reason to suspect that an endocrine disturbance is materially contributing to the coma or apnoea?** *If there is doubt, appropriate endocrine assays should be undertaken.*	**Dr One** **Yes / No**	**Dr Two** **Yes / No**	**Dr One** **Yes / No**	**Dr Two** **Yes / No**

To diagnose death all answers must be in mmol/L range, YES or can be mitigated

	Test 1		**Test 2**	
Precondition 3 **Are you satisfied that potentially reversible factors which could be materially contributing to the coma or apnoea have been considered and excluded?**	**Dr One** **Yes / No**	**Dr Two** **Yes / No**	**Dr One** **Yes / No**	**Dr Two** **Yes / No**

If NO, document mitigation
e.g. ancillary investigation, Page 5

Precondition 3 (continued): ALL answers must be in mmol/L range, YES or can be mitigated

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Patient Name: **NHS / CHI Number:**

Precondition 4
Additional caution in uncommon circumstances

Guidance (Consult Code 6.35 – 6.37 if any of the below are present)

4.1 Aetiology primarily <u>isolated</u> to the posterior fossa or brainstem. (Code 6.35)

4.2 Therapeutic decompressive craniectomy and other conditions where intracranial compliance may be significantly increased. (Code 6.36)

4.3 Patients receiving therapeutic steroids to reduce brain oedema (e.g. tumour, abscess, meningitis or trauma). (Code 6.37)

	Test 1		Test 2	
Precondition 4 **Have the uncommon circumstances been excluded?**	**Dr One** **Yes / No**	**Dr Two** **Yes / No**	**Dr One** **Yes / No**	**Dr Two** **Yes / No**

If No, document mitigation
e.g. ancillary investigation

Precondition 4: ALL answers must be YES or can be mitigated. Document any ancillary investigation.

Ancillary Investigations

Guidance (Code 6.54 – 6.67)

- **Ancillary investigations are not routinely required.** The diagnosis of DNC is primarily a clinical diagnosis based upon the satisfaction of preconditions and two sets of clinical tests. (Code 6.55)
- In certain situations, it may not be possible to satisfy all the preconditions or perform or complete all the clinical tests necessary to diagnose DNC. In such circumstances, the addition of an ancillary investigation, <u>either before or after clinical testing</u>, is necessary to support DNC. Any ancillary investigation should be additional to the fullest examination and clinical testing, carried out to the best of the doctors' capabilities in the given circumstances. (Code 6.56, 6.59)
- All ancillary investigations, including their timing to clinical testing, have different sensitivity and specificity, and their results should be interpreted carefully. The ancillary investigation undertaken for any patient depends on any national guidance, local availability of that investigation and access to expertise to interpret the result. A UK multi-professional consensus guideline for the use of cerebral CT angiography has been published. (Code 6.57,6.61) The evidence base in children is limited and specialist advice should be sought. (Appendix 2, A9)
- **Ancillary investigation is required (Code 6.64):**
  - When a comprehensive neurological examination, including the apnoea test, is not possible (e.g. high cervical cord pathology, inability to examine both eyes or both ears).
  - When continuing effects of confounding factors which affect the preconditions cannot be excluded (e.g. residual sedation, metabolic or pharmacological derangement, decompressive craniectomy).

If any ancillary investigation has been performed document
Reason(s):

Type / modality:
Time performed:
Results:

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Patient Name: **NHS / CHI Number:**

Clinical testing for the absence of brainstem reflexes

Guidance (Code 6.39-6.43)

- The diagnosis is a two-stage process. Two full sets of clinical tests (including two apnoea tests) must be undertaken by the doctors. The two doctors in each test work together. Typically, one doctor will perform the first set of tests while the other observes, with roles reversed for the second set. It is acceptable for another doctor to undertake or observe the second set, or for another separate pair of doctors to undertake the second set. In all circumstances the two doctors in each set of tests must satisfy the requirements of 'Who can use neurological criteria' (Form Page 1) and be individually willing to document that death has been diagnosed and confirmed using neurological criteria. (Code 6.6-6.8, 6.49)
- If the first set of clinical tests shows no evidence of brainstem function there need not be a lengthy delay before performing the second set. The patient's arterial blood gases and baseline parameters should be restored to appropriate pre-test level, before commencing the second set. (Code 6.50)
- It must be possible to examine both eyes and there should be no reason to suspect an eye injury or abnormality would prevent the reflex occurring if it could. (Code 6.42) Similarly, both ears must be able to be accessed for the oculovestibular reflex. (Code 6.43c) In the case of an inability to examine both eyes or both ears, for whatever reason, ancillary investigation will be required. (Code 6.64)

	Test 1		Test 2	
Apply an adequate stimulus, bilateral where able, which would ordinarily generate a response. (Code 6.42, 6.43) ***To diagnose death, ALL answers must be NO***	**Dr One**	**Dr Two**	**Dr One**	**Dr Two**
Pupillary reflex (cranial nerves II, III) **Do the pupils react to light?** *Test for direct and consensual response on both sides. Pupils must be fixed in a midsize or dilated position.*	**Yes / No**	**Yes / No**	**Yes / No**	**Yes / No**
Corneal reflex (cranial nerves V,VII) **Is there any eyelid movement when each cornea is touched in turn?** *Touching the sclera is not sufficient. The use of sterile gauze is recommended.*	**Yes / No**	**Yes / No**	**Yes / No**	**Yes / No**
Motor response (cranial nerves V,VII) **Is there any motor response within the cranial nerve or somatic distribution when supraorbital pressure is applied?** *Repeat both sides. Somatic reflex limb and trunk movements (spinal reflexes) may need to be differentiated. (Code 6.19)*	**Yes / No**	**Yes / No**	**Yes / No**	**Yes / No**
Gag reflex (cranial nerves IX,X) **Is the gag reflex present?** *Stimulate the posterior pharynx bilaterally. Use a tongue depressor or firm suction catheter (e.g. Yankauer sucker). A laryngoscope may assist.*	**Yes / No**	**Yes / No**	**Yes / No**	**Yes / No**
Cough reflex (cranial nerves IX,X) **Is the cough reflex response present?** *Pass a suction catheter down the trachea to the carina.*	**Yes / No**	**Yes / No**	**Yes / No**	**Yes / No**
Vestibulo-ocular reflex (cranial nerves III, IV, VI VIII) **Is there any eye movement seen during or following the slow injection of at least 50 ml (20-50 ml for a child) ice-cold water over 1 minute into each ear, with the head flexed at 30°?** *Each ear drum should be clearly visualised before the test.*	**Yes / No**	**Yes / No**	**Yes / No**	**Yes / No**

Brainstem Reflexes

Clinical testing of brainstem reflexes: ALL answers must be NO

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Patient Name: **NHS / CHI Number:**

The apnoea test

Guidance (Code 6.44-6.48)

- **The apnoea test must not be performed while the patient is connected to a mechanical ventilator.** Pre-oxygenate FiO_2 1.0. Prepare a CPAP circuit (e.g. Mapleson C or equivalent).
- Oxygenation and cardiovascular stability should be maintained through each apnoea test.
- The 5 minutes observation is a minimum. Some doctors may choose to delay taking the confirmatory arterial blood gas sample immediately at 5 minutes to increase the certainty that the $PaCO_2$ and pH have reached the apnoea END arterial targets.
- In the case of an absolute inability to complete the apnoea test, for whatever reason, ancillary investigation will be required to support a diagnosis of DNC. The ancillary investigation is in addition to the fullest application of neurological criteria possible in the specific circumstance.

	1st Test	2nd Test
START time Document time when apnoea test was commenced.	**hr : min** (24 hour clock)	**hr : min** (24 hour clock)
START arterial $PaCO_2$ – is at least 5.3 kPa *In patients who require a higher $PaCO_2$ to breathe (Code 6.44) start the apnoea test at a $PaCO_2$ at or above their chronic or typical baseline if known.*	**START $PaCO_2$** **kPa** *Must be at least 5.3 kPa*	**START $PaCO_2$** **kPa** *Must be at least 5.3 kPa*
Calculate apnoea test TARGET $PaCO_2$ *Use a calculator* *TARGET $PaCO_2$ is 2.7 kPa more than START $PaCO_2$, and TARGET $PaCO_2$ must be least 8.0 kPa.*	**TARGET $PaCO_2$** START + 2.7 **=** **kPa**	**TARGET $PaCO_2$** START + 2.7 **=** **kPa**
END arterial $PaCO_2$ – has reached TARGET $PaCO_2$ *Must have reached TARGET $PaCO_2$*	**END $PaCO_2$** **kPa** Must have reached TARGET *$PaCO_2$*	**END $PaCO_2$** **kPa** Must have reached TARGET *$PaCO_2$*
END arterial pH – is less than 7.3 ([H+] greater than 50 nmol/L)	**END pH/[H+]** pH less than 7.3 [H+] greater than 50nmol/L	**END pH/[H+]** pH less than 7.3 [H+] greater than 50nmol/L
END time Document time when apnoea test was ceased. *Must be a minimum of 5 minutes.*	**hr : min** (24 hour clock) Perform lung recruitment	**hr : min** (24 hour clock) Perform lung recruitment

Was any spontaneous respiratory effort observed over a *minimum* of 5 (five) minutes following disconnection from the ventilator? **(To diagnose death, ALL answers must be NO)** *In the case of an absolute inability to complete the apnoea test document ancillary investigation, Page 5*	**Dr One** **Yes / No**	**Dr Two** **Yes / No**	**Dr One** **Yes / No**	**Dr Two** **Yes / No**

Apnoea Test (the apnoea test must be performed twice)

Considerable atelectasis may develop even with CPAP. At the conclusion of the apnoea test, carry out a manual recruitment manoeuvre.

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Patient Name: **Date of Birth:** **NHS / CHI Number:**

Completion of Diagnosis

Register of the doctors carrying out the diagnosis

Test 1		Test 2	
Date: **Time:**		**Date:** **Time:**	
Dr One *Name* *Grade* *GMC* *Signature*	**Dr Two** *Name* *Grade* *GMC* *Signature*	**Dr One** *Name* *Grade* *GMC* *Signature*	**Dr Two** *Name* *Grade* *GMC* *Signature*

Guidance

- Death is confirmed at the time when all doctors involved in carrying out the clinical tests are satisfied all the relevant neurological criteria to diagnose death are met.
- **This would ordinarily be at the time of completion of the second set of clinical tests. This becomes the time of death.**
- If ancillary investigations are required to confirm death, and are carried out after clinical testing, the time of death will be the point at which the result of the ancillary investigation is available to the final two doctors in Test 2.

Confirmation of Death by the Final Two Doctors in Test 2

Are you satisfied that death has been confirmed following the permanent cessation of brainstem function?	**Dr One** **Yes / No**	**Dr Two** **Yes / No**
Time of Death **Date** **Time**	**Dr One** *Signature*	**Dr Two** *Signature*

References & Resources

- Academy of Medical Royal Colleges. A Code of Practice for the Diagnosis and Confirmation of Death. 2025. www.aomrc.org.uk
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- Donation Actions Framework. A Professional, Ethical and Legal Framework for Deceased Organ Donation Actions. 2022. https://www.odt.nhs.uk/deceased-donation/best-practice-guidance/donation-actions-framework/
- GPICS 2.1. 2022. https://www.ficm.ac.uk/standards/guidelines-for-the-provision-of-intensive-care-services
- Meadows C, Toolan M, Slack A, et al. Diagnosis of death using neurological criteria in adult patients on extracorporeal membrane oxygenation: Development of UK guidance. *J Intensive Care Soc 2020*; 21:28-32. DOI: 10.1177/1751143719832170.
- Thomas EO, Manara A, Dineen RA, et al. The use of cerebral computed tomographic angiography as an ancillary investigation to support a clinical diagnosis of death using neurological criteria: a consensus guideline. *Anaesthesia 2023*;78:330-336. DOI: 10.1111/anae.15950.
- Dineen RA, Thomas EO, Mortimer A, et al. Cerebral CT angiography as an ancillary investigation in the diagnosis of death using neurological criteria: a new UK guideline. Clinical Radiology 2023;78:e166-168. DOI: 10.1016/j.crad.2022.12.003.

FICM Webpage on DNC www.ficm.ac.uk/diagnosing-death-using-neurological-criteria
A series of helpful education videos are available from NHSBT at www.odt.nhs.uk

Form feedback
Comments and feedback should be directed to contact@ficm.ac.uk