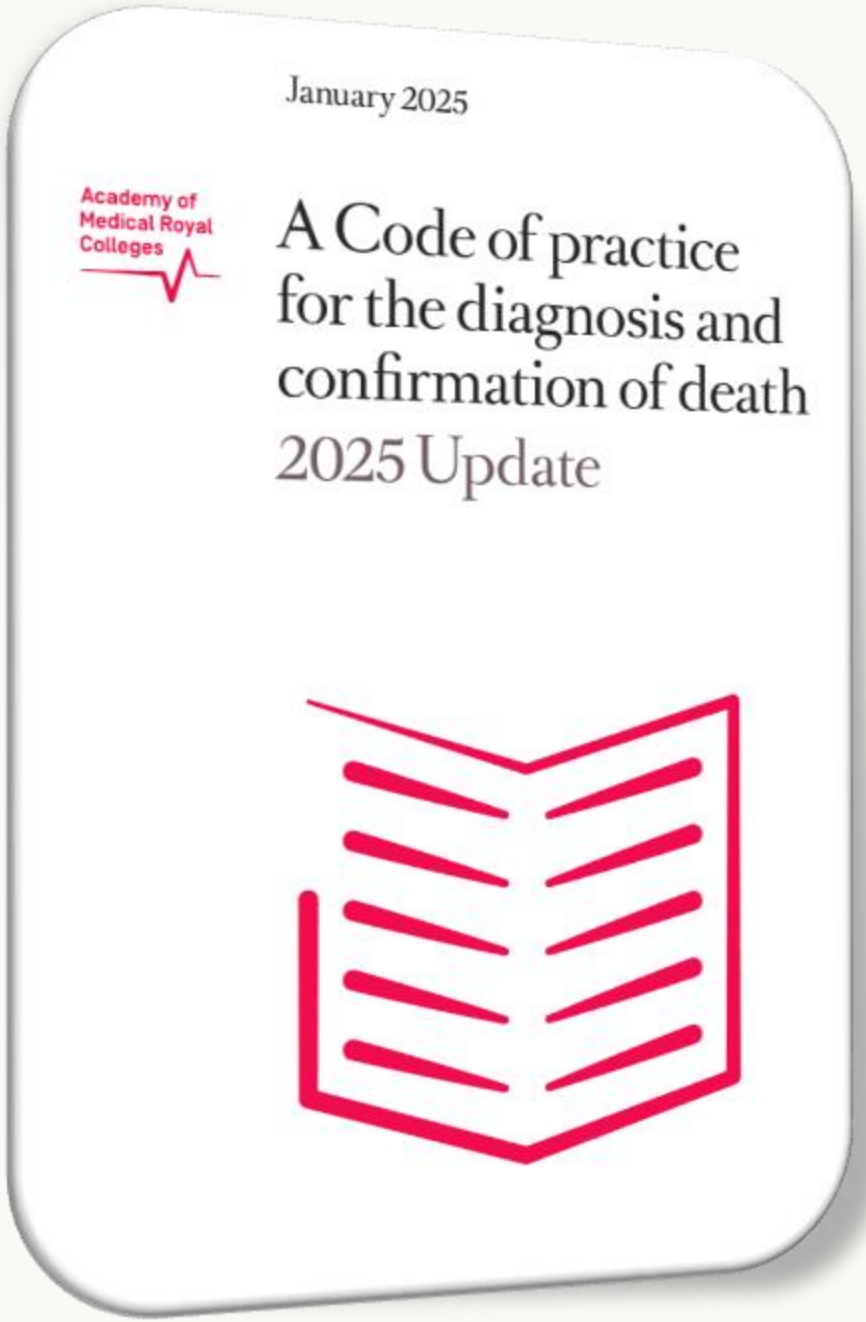


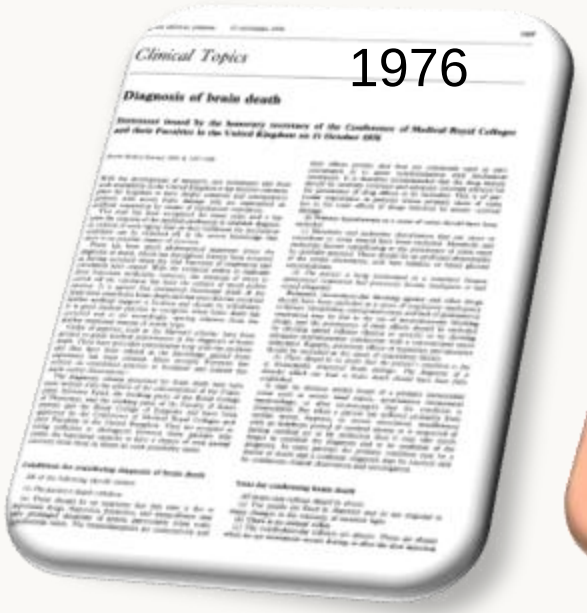
COMING SOON

1st January 2025

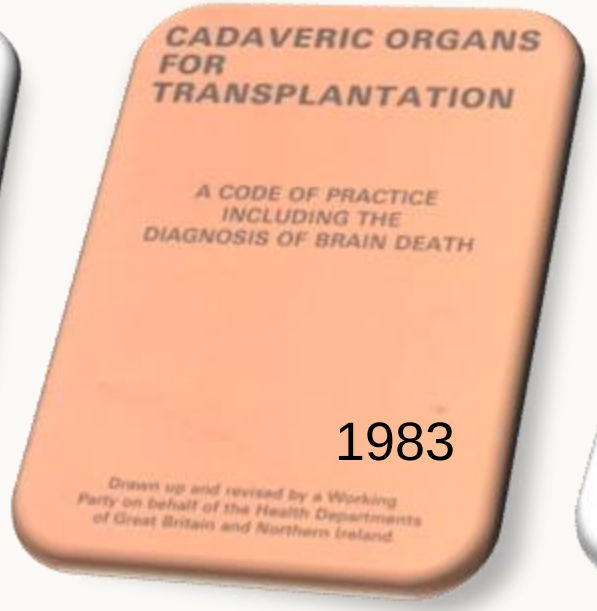
Who is ‘responsible’ for Death Criteria in the UK?

Academy of Medical Royal Colleges

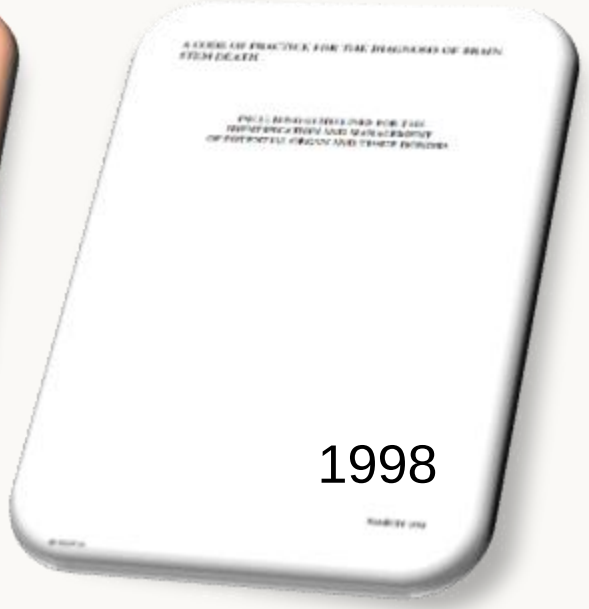
UK Codes of Practice

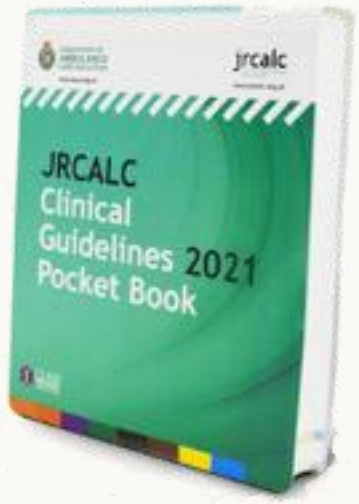


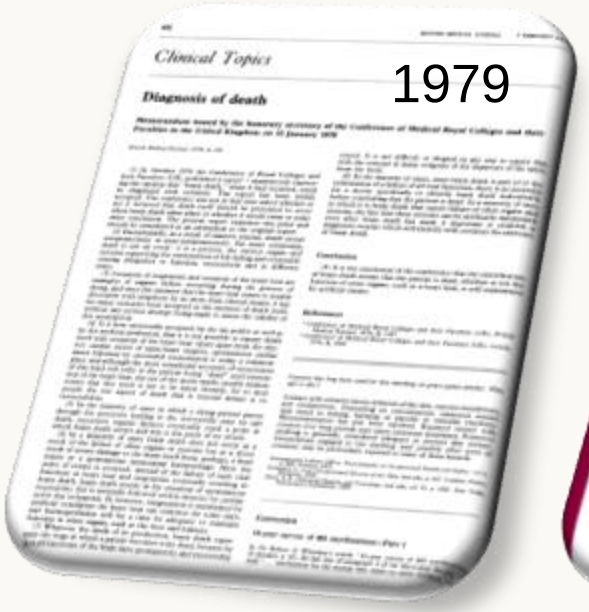
1976



1983


1998





1979

2008

2015

Updating Principles

- **Update and evolve** the 2008 Code.

  Death has not changed! Old criteria were safe!

  But the Code will be 17 years old; needs to keep pace with medical advances and evolving international knowledge and guidance.
- Provide **authoritative** guidance.
- **Clearly articulate the diagnostic criteria**, whatever the circumstance in which the death has occurred.
- Maintain **safety and confidence** in the diagnosis of death. **Where necessary, strengthen** the Code.
- Where possible **complement and align across all ages and with other international guidelines.**
- **Support healthcare professional's communication** with patients, their families and the public.
- **Increase healthcare professional and public understanding** of how we know when someone has died.

1 definition of death : 3 sets of criteria

Neurological Criteria

Circulatory Criteria

DEATH

Permanent loss of the capacity for consciousness

Permanent loss of the capacity to breathe

Somatic Criteria

Who can use the 3 sets of criteria

Neurological Criteria

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…**
A minimum of two doctors, but on occasion up to four doctors, will diagnose death using neurological criteria in any patient.

Appropriately trained and competent individual, **ordinarily a healthcare professional**, who is physically present with the person being diagnosed deceased… **competent in the use of a stethoscope.**

Circulatory Criteria

DEATH

Permanent loss of the capacity for consciousness

Permanent loss of the capacity to breathe

Somatic Criteria

Appropriately trained and competent individual, who is physically present with the person being diagnosed deceased.

New in 2025 Code

Important for reassurance that CPR is not required.

Somatic Criteria

Overwhelming Physical Trauma

Decapitation

Massive cranial and cerebral destruction

Hemicorporectomy or similar massive injury

Incineration

Time based signs

Post-mortem hypostasis / livor mortis

Rigor Mortis

Decomposition/putrefaction

Foetal maceration in a newborn

Closely modeled on the '***Conditions unequivocally associated with death'*** from The Association of Ambulance Chief Executives (AACE) and Joint Royal Colleges Ambulance Liaison Committee (JRCALC)

Circulatory Criteria

Circulatory Criteria

What's new?

Very little has changed.

Clarifications only:

- The purpose of the 5 minutes (the possibility of spontaneous resumption of cardiac function will have passed).
- **The clinical examination required.**

Precondition
One of the following must be fulfilled:

a. A decision has been made not to commence resuscitation.
b. Attempts at resuscitation have been made but have not been successful and resuscitation has stopped.

If there is any doubt, the need to attempt or continue CPR must be considered.

Circulatory Criteria

Observe and examine over a minimum of 5 minutes for:

- **Continuous unconsciousness.**
- **Continuous absence of breathing** (apnoea), as indicated by the absence of visible chest movements and audible breath sounds on auscultation with a stethoscope.
- **Continuous absence of circulation**, as indicated by absence of a central pulse on palpation and by absence of heart sounds on auscultation with a stethoscope.

There is no requirement that the healthcare professional palpate for a central pulse or auscultate for breath or heart sounds over the **entire 5 minutes.** However, the healthcare professional must **be physically present and observing the patient for the full 5 min**utes and be **satisfied their examination is sufficient.**

Circulatory Criteria

To support a timely diagnosis soon after cardiorespiratory arrest, can supplement with one or more of:

- Absence of cardiac electrical activity on a continuous electrocardiogram **(ECG)** display.
- Absence of cardiac contraction using **echocardiography.**
- Absence of pulsatile arterial pressure on an appropriately scaled, continuous **intra-arterial pressure monitoring trace.**

The 5 minute assessment period commences with the onset of circulatory arrest (mechanical asystole) and apnoea. Echocardiography and direct intra-arterial pressure monitoring can detect circulatory arrest more rapidly than ECG. **Electrical asystole therefore is not required if echocardiography or intra-arterial pressure monitoring can be used.**

Circulatory Criteria

Following the 5 minutes assess:

- For the absence of the **pupillary responses to light** and the absence of any motor response to **supraorbital pressure.**

When death is being diagnosed and confirmed soon after cardiorespiratory arrest, we recommend that the neurological examination be supplemented by confirming the absence of **corneal reflexes.**

Any spontaneous return of circulatory, respiratory or neurological function should be followed by a further 5 minutes assessment from the next point of cardiorespiratory arrest.

Circulatory Criteria

Additional considerations

- The confirmation of death should occur in a **timely manner and as soon as is practicable**, bearing in mind the potential implications of delay for family and others. Families should be advised that there might be a difference between the time of the last observed breath and the documented time of death [Section 7-Communication].

- Some modern organ donation retrieval procedures involve the restoration of the circulation in part of the body after death. If these procedures are used, protocols must ensure there is no blood circulation to the brain.

Neurological Criteria

Neurological Criteria

“No new science has altered the fundamentals to the criteria used to diagnose and confirm death as outlined in previous Codes…
The working group therefore considered their role to be one of updating and evolving the 2008 Code.”

Key Updating Principles

- **Provide authoritative guidance.**
- Maintain safety and confidence in the diagnosis of death. **Where necessary, strengthen the Code.**
- Where possible **complement and align across all ages and with other international guidelines.**

Main Influences

- 2020, World Brain Death Project
- 2021, Australian and New Zealand Intensive Care Society's Statement on Death and Organ Donation
- 2023, Canadian Journal of Anesthesia Special Issue: Defining and Determining Death in Canada
- 2023, Pediatric and Adult Brain Death/Death by Neurologic Criteria Consensus Guideline from the American Academy of Neurology and the American Academy of Pediatrics.

3 Major Updates to DNC

1. Age Categories

< 37 weeks.	DNC cannot be confidently made.
37 weeks – 24 months.	Same as per adults with three caveats: 24 hrs before testing, 24 hrs between testing and no ancillary investigation.
> 24 months.	Criteria as per adults. Specialist advice for ancillary investigations.

2. Apnoea Test

Start. $PaCO_2 \geq 5.3$ KPa

End. $PaCO_2 \geq 8.0$ kPa, pH < 7.3 + Rise $PaCO_2 \geq 2.7$ kPa

Time. Minimum 5 minutes

3. Time of Death

Completion of the second set of clinical tests.

1. Age Categories

Royal College of Paediatrics and Child Health
Leading the way in Children's Health

< 37 weeks.	DNC cannot be confidently made.
37 weeks – 24 months.	Same as per adults with three caveats: 24 hrs before testing, 24 hrs between testing and no ancillary investigation.
> 24 months.	Criteria as per adults. Specialist advice for ancillary investigations.

Why change

- Moderate international consensus for the lower limit of 37 weeks.
- Transition to adult criteria very variable internationally both in clinical testing and support for ancillary investigations in infants and young children.
  - 2 months UK previous Codes, 30 days ANZICS, 1 month / 1 year Canada, USA 2 years.
- "As a pragmatic solution, taking together all the available evidence, combined with a desire to align more closely to international guidance, and without intending to cast doubt on any previous diagnosis of death in the UK, the working group recommends the age of ≥24-months (2-years corrected age for children born prematurely)…"

2. Apnoea Test

Start. **$PaCO_2 \geq 5.3$ KPa**

End. **$PaCO_2 \geq 8.0$ kPa, pH < 7.3 + Rise $PaCO_2 \geq 2.7$ kPa**

Time. Minimum 5 minutes

Why change

- The working group had no safety concerns with the current UK apnoea test as outlined in the 2008 Code.
- UK apnoea test described as an ‘augmented carbon dioxide apnoea test’.

- **Use the opportunity created by the update to align the UK more closely with international practice.**
- **Can be used across all age groups.**

	AoMRC 2008	RCPCH 2015	WBDP 2020	ANZICS 2021	Canada 2023	USA 2023	AoMRC 2025
Start $PaCO_2$	≥ 6.0 pH < 7.4	≥ 5.3	4.7 - 6.0	-	-	4.7-6.0 pH 7.35-7.45	≥ 5.3
Rise $PaCO_2$	0.5	> 2.7	-	-	≥ 2.7	≥ 2.7	≥ 2.7
End $PaCO_2$	-	> 8.0	≥ 8.0 pH <7.30	> 8.0 pH <7.30	≥ 8.0 pH ≤ 7.28	≥ 8.0 pH <7.30	≥ 8.0 pH <7.30
Time	Minimum 5 minutes		Check at 10 minutes	Check after 10 minutes or shorter if start $PaCO_2$ is 6 (advice given this can shorten the time)		Check 8-10 mins	Minimum 5 minutes

Apnoea Test
AoMRC 2025

International alignment
Use all ages

2.7 kPa
= 20 mmHg

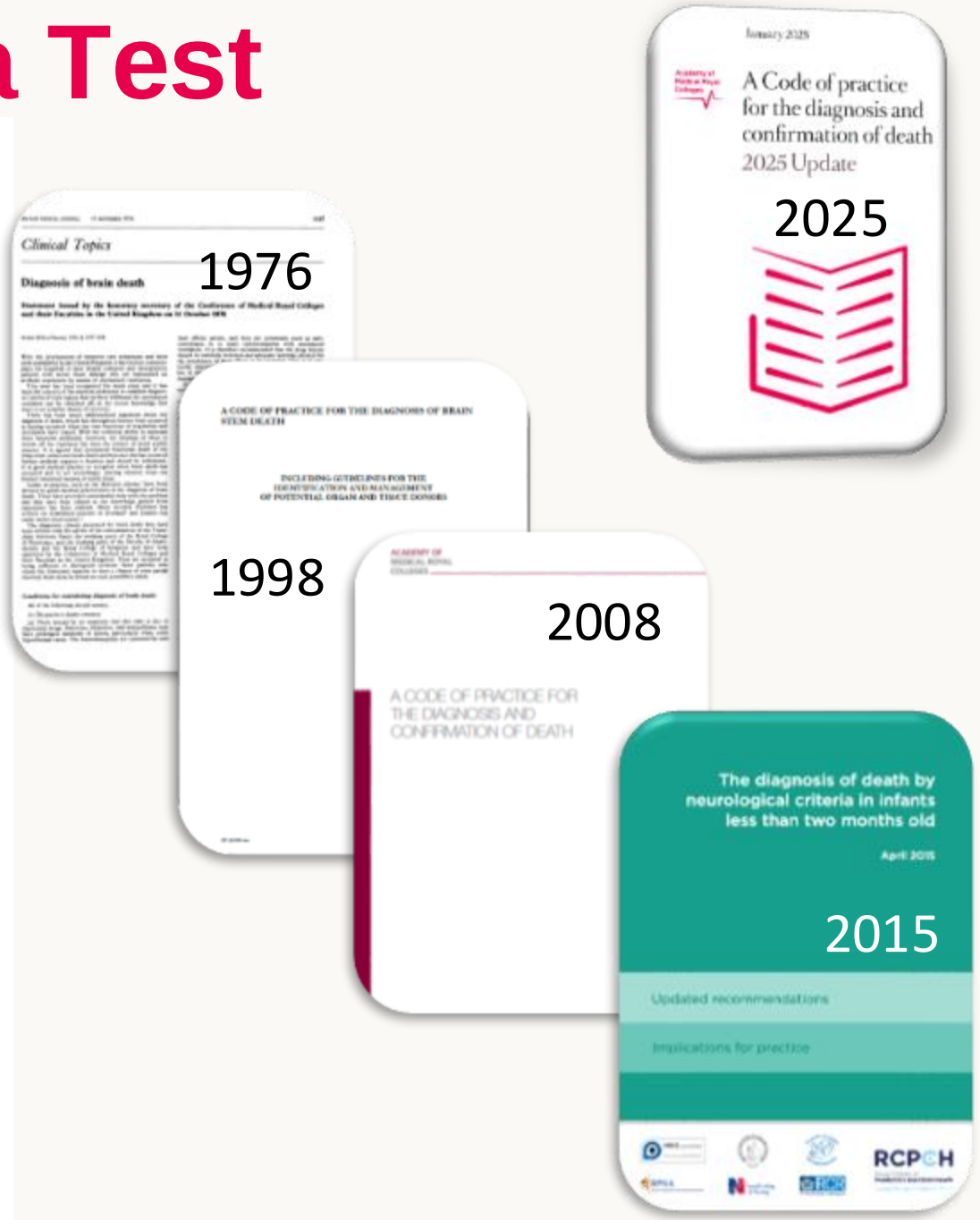
Main worldwide alignment is for an End $PaCO_2$ & pH

$PaCO_2$ rises approx. 0.5 kPA per minute
5 x 0.5 = 2.5

5 minutes is a minimum

2. Apnoea Test

UK Code	Apnoea test description
1976[1]	End $PaCO_2$ ≥ 6.7 kPa (50 mmHg). *Point of care blood gas analysis available.* Augmentation via the ventilator with 5% CO_2 in oxygen. Start. $PaCO_2$ 5.3 – 6.0 kPa No minimum time specified. *Point of care blood gas analysis not available.* Augmentation via the ventilator with 100% O_2 for 10 minutes then 5% CO_2 for 5 minutes. Disconnect for 10 minutes.
1998[4]	End $PaCO_2$ ≥ 6.65 kPa (50 mmHg). If the facility for administering 5% CO_2 in oxygen exists, this is the preferred method for performing this test. Augmentation via the ventilator with 100% O_2 for 10 minutes then 5% CO_2 for 5 minutes. Disconnect for 10 minutes.
2008[5]	Start. $PaCO_2$ ≥ 6.0 kPa, pH < 7.4 Time. Minimum 5 minutes Rise. $PaCO_2$ > 0.5 kPa
2015 RCPCH[6]	Start. $PaCO_2$ ≥ 5.3 kPa Rise. $PaCO_2$ > 2.7 kPa End. $PaCO_2$ > 8.0 kPa
2025	Start. $PaCO_2$ ≥ 5.3 kPa Time. Minimum 5 minutes Rise. $PaCO_2$ ≥ 2.7 kPA End. $PaCO_2$ ≥ 8.0 kPa, pH < 7.3



2. Apnoea Test

Start. **$PaCO_2 \geq 5.3$ KPa**

End. **$PaCO_2 \geq 8.0$ kPa, pH < 7.3 + Rise $PaCO_2 \geq 2.7$ kPa**

Time. **Minimum 5 minutes**

Must be performed off a ventilator.

In practice

- $PaCO_2 \geq 5.3$ KPa. Likely easier to achieve. (5.3 +2.7 = 8.0)
- $PaCO_2 \geq 8.0$ kPa, pH < 7.3. Nearly always achieved currently.
- $PaCO_2 \geq 2.7$ kPa. “Some doctors may choose to delay taking the confirmatory arterial blood gas sample immediately at 5 minutes, to increase the certainty that the PaCO2 and pH have reached the apnoea end arterial blood targets.”
- *The 5 minutes observation is a minimum.*

(2.7 kPa = 20 mmHg, 5.3 kPa = 40mmHg, 8.0 KPa = 60 mmHg)

3. Time of Death

Completion of the second set of clinical tests.
If ancillary investigations are used after clinical testing, the point at which the final two doctors undertaking the process are satisfied that all the relevant neurological criteria to diagnose and confirm death are met.

Why change

- International alignment.
- While two sets of tests are not mandated in all countries the working group had no desire to depart from the 2008 Code and the mandated requirement for two sets of clinical tests, including two apnoea tests.
- 1976 'customary' to repeat the tests, 1981 'should nevertheless be repeated, 1998 'two sets of tests should always be performed, 2008 and 2025 'must always be performed on two occasions'.
- Courts have ordinarily deferred to healthcare professionals. Re A (A Minor) 1992. Already supportive discussion. e.g. Deputy Chief Coroner, National Medical Examiner.
- Families increasingly witness the second set of tests; and wish to present at time of death.

Other Updates to DNC

Greater Alignment to the rest of the world

4. Minimum **core temperature of 36°C.**
   - In patients who are hypothermic (< 36°C), either therapeutic or accidental, a minimum 24 hour observation period is required following correction of hypothermia.
   - Once rewarmed a transient fall below 36°C does not require an additional 24 hours observation.
   - The core temperature should be greater than or equal to 36°C at the time of clinical testing.
5. It must be possible to **examine both eyes** and **both ears.**

   If can't, ancillary investigation.

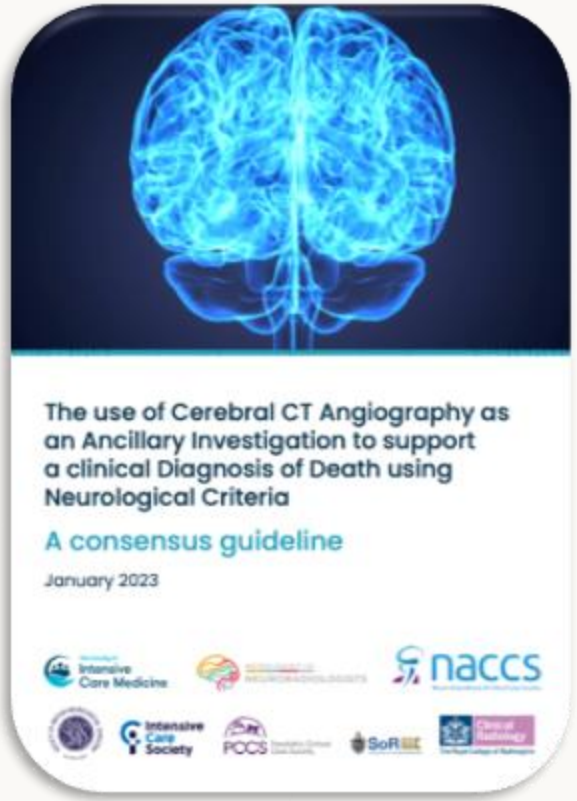
Other Updates / Clarifications to DNC

- **Clarifications who can test**
  - Full registration GMC 5 years or equivalent
  - Up to four doctors may be needed to diagnose DNC.
- **Recognition of the responsibility of professional bodies** (forms - will be 1 form, education, reviewing / sharing learning in difficult cases).
- **Preconditions more specific** (8 'red flags' incorporated into preconditions).
- **Peripheral nerve stimulator should be used** (re-emphasis was in all the old Codes).
- **Encouragement to offer families opportunity to observe 2nd set of tests.**
- **Expanded discussion of non-brain mediated movements.**
- **Expanded discussion on cervical spinal cord pathology / posterior fossa.**
- Minimum **sodium** concentration as a precondition for testing increased from 115 mmol/L to **125 mmol/L.**

Ancillary Investigations

- Not routinely required. Is not a full replacement. Additional.
- Seek specialist advice in children. Not < 24 months of age.
- EEG no longer recommended.
- **Required:**
  - 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).
- **Can be considered** when there is uncertainty regarding the interpretation of presumed non-brain mediated movements.
- **Sometimes may help promote understanding** to families who are uncertain or unaccepting of DNC; ancillary investigation being used to provide reassurance rather than as a diagnostic aid.

CT Angiography



A consensus protocol for the use of CT Angiography. 2023

Full Version website FICM & ICS
Anaesthesia 2023
Clinical Radiology 2023

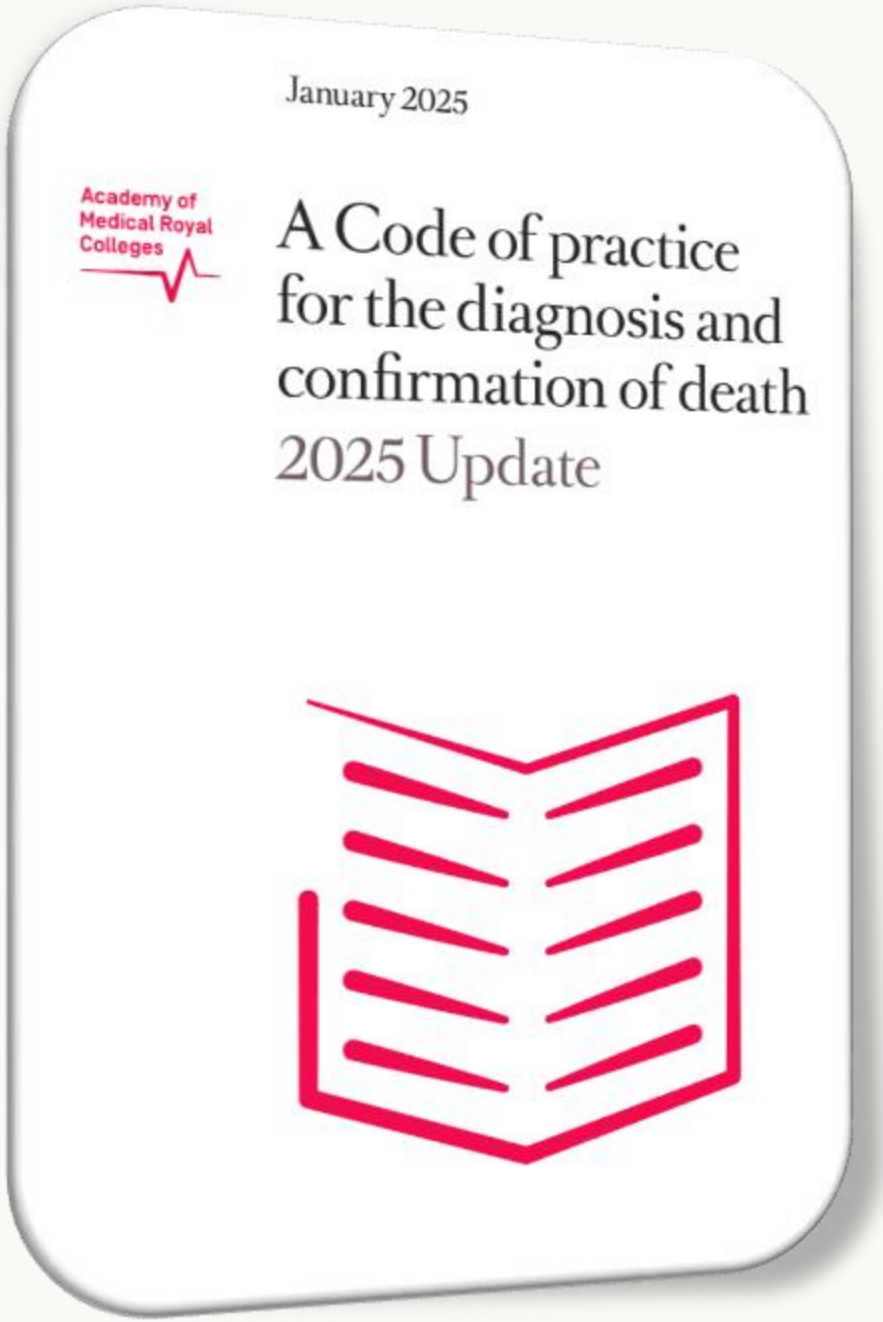
The Faculty of Intensive Care Medicine
BRITISH SOCIETY OF NEURORADIOLOGISTS
naccs Neuro Anaesthesia & Critical Care Society
Society of British Neurological Surgeons
Intensive Care Society
PCCS Paediatric Critical Care Society
SoR 100 The Society of Radiographers
Clinical Radiology The Royal College of Radiologists

Endorsing Organisations

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. The Academy considers that healthcare professional organisations, with appropriate expertise, are best placed to maintain up to date national guidance on ancillary investigations.

RCPCH Royal College of Paediatrics and Child Health
Leading the way in Children's Health

CTA & MRA – specialist centres in older children.
Radionuclide imaging of brain perfusion using 99mTc HMPAO-SPECT – specialist centres in the child aged older than 24-months.



Implementation 1st January 2025

To learn more

- *Academy website (Code, lay summary)*
- *FICM Website (testing forms)*

New Code

Death using Neurological Criteria (DNC)

MAJOR UPDATES

1. Age Categories

< 37 weeks	DNC cannot be confidently made.
37 weeks – 2 years	Same as per adults with 3 caveats: I. 24 hrs before testing II. 24 hrs between testing III. No ancillary investigation.
2 years	Criteria as per adults.

2. Apnoea Test

Start. $PaCO_2 \geq 5.3$ KPa

End. $PaCO_2 \geq 8.0$ kPa, pH < 7.3 + Rise $PaCO_2 \geq 2.7$ kPa

Time. Minimum 5 minutes

3. Time of Death

Completion of the second set of clinical tests.

New Code

1st January 2025

Death using Neurological Criteria (DNC)

OTHER SIGNIFICANT UPDATES/CLARIFICATIONS

Greater alignment rest of the world

4. **Temperature 36 °C**
5. **Both eyes, both ears must be examinable**

Other / Clarifications

- Who
  - Full registration GMC 5 years **or equivalent**
  - Up to 4 doctors
- Preconditions more specific and the 8 ‘red flags’ incorporated into preconditions.
- Peripheral nerve stimulator use.
- Minimum sodium concentration as a precondition for testing increased from 115 to 125 mmol/L.
- Expanded ancillary investigation guidance.

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)**

NOT FOR USE

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)*, with special attention to Appendix 2 from the Royal College of Paediatrics and Child Health.
Endorsed for use by:

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 infants between 37-weeks to 2-years, corrected gestational age.

Preparation

1. **Key differences between infants, older children and adults (Code 6.38, Appendix 2)**
   - *Below 37-weeks gestation* (post menstrual): The diagnosis of death using neurological criteria cannot be confidently made.
   - *From 37-weeks corrected gestation (post menstrual) to 2-years corrected age post term*: The diagnosis of death using neurological criteria can be confidently made by following the Code provided the following three caveats are followed:
     1. Neurological criteria should **not be applied until at least 24 hours** following the loss of the last observed brainstem reflex or spontaneous breath.
     2. The **interval between the two clinical tests** (refered to as Test 1 and Test 2 in this form) **should be at least 24 hours**.
     3. At present **ancillary investigations should not be used** to support the diagnosis of death using neurological criteria in children under 2-years of age.
   - *Above 2-years corrected age post term*: The diagnosis of death using neurological criteria can be confidently made by following the Code using the same criteria applicable to adults – use the Adult and Children older than 2-years Testing Form.

2. **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)

3. **Who can use neurological criteria? (Code 6.6-6.12, Appendix 2: A5)**
   - The diagnosis of Death using Neurological Criteria (DNC) should be made by at least two doctors (e.g. paediatricians and/or suitably qualified specialists) 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.

4. **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 circuit, Neopuff or equivalent).

NOT FOR USE