



## CLINICAL POLICY

### Brain Death

**A. EFFECTIVE DATE:**

December 20, 2022

**B. PURPOSE:**

To provide guidelines for the determination of death by neurological criteria.

**C. POLICY:**

1. Ethical and legal considerations dictate that physicians must take responsibility for determining when an individual is dead, that is, when an individual has sustained either 1) irreversible cessation of circulatory and respiratory functions, or 2) irreversible cessation of all functions of the entire brain, including the brain stem. Brain death must not be confused with the care of the severely brain damaged individual who continues to have some brain function.
2. Criteria have been developed which can reliably determine when an individual has suffered irreversible loss of vital functions.
3. Determination of brain death requires two qualified physicians who are certified to perform brain death examinations. Exams could be performed concurrently or separated by a period of time if there are questions on the mechanism or timing of the insult. The examination(s) should be clearly documented in the medical record.
4. Fulfillment of the following criteria provide necessary and sufficient evidence of brain death.
5. The examining physicians begin their evaluation with the assumption that the patient is alive and that they have a traditional consultant-patient responsibility to the patient, and they bear the burden of proof in determining if the patient is dead by neurological criteria.
6. Any doubt by the physician in the interpretation of any of the following procedures implies the possibility of brain function, and the individual cannot be declared dead.
7. For the purpose of this policy and procedure, a qualified physician is any neurologist, neurosurgeon, or intensivist on the John Dempsey Hospital Medical Staff, either full or part time, who has been certified to perform this examination and procedure.

8. If it is determined that the patient meets brain death criteria, professional staff must notify New England Donor Services for potential organ/tissue donation.

**D. SCOPE:**

This policy applies to all JDH Clinical areas.

**E. DEFINITIONS:**

None

**F. MATERIAL(S) NEEDED:**

None

**G. PROCEDURE:**

1. The first exam may not take place until a minimum of twelve (12) hours has elapsed from the time of the event that contributed to patient's condition. The examinations involve three key elements.
  - A. Establish irreversible and proximate known cause of coma, supported by Neuroimaging.
  - B. Ensure there are no confounding factors that can cause coma:
    - (1) No presence of a CNS-depressant drug. Clearance of the drug should be calculated using 5 times the drug's half-life, or drug plasma levels below the therapeutic range. Prior use of hypothermia may delay drug metabolism. The legal alcohol limit for driving is a practical threshold below which an examination to determine brain death can be reasonably proceed.
    - (2) No recent administration or continued presence of neuromuscular blocking agents. This can be tested by using train of four twitches with maximal ulnar nerve or facial nerve stimulation.
    - (3) Absence of severe acid-base, electrolyte, endocrine abnormality,
    - (4) Patient is normothermic ( $\geq 36^{\circ}\text{C}$ ) for at least 24 hours.
    - (5) Mydriatic agents are not the cause of fixed and dilated pupils.
    - (6) Systolic blood pressure  $\geq 100$  mmHg.
  - C. There is a total and irreversible cessation of all brain function. This includes all of the following:
    - (1) Cerebral unresponsivity – deep coma with total unresponsiveness and unawareness. There is no eye opening or eye movement to noxious stimuli. There is no spontaneous movement or posturing (except pure spinal segmental responses). Decorticate or decerebrate posturing will exclude the patient from being declared dead. Pure spinal reflexes (deep tendon reflexes, triple flexion response) may be maintained.
    - (2) Absence of all brain stem reflexes:
      - (a) Absence of pupillary response to a bright light is documented in both eyes. Pupils are fixed in diameter (mid-sized or dilated position) and do not respond to sharp changes in intensity of

light.

- (b) Absence of corneal reflexes is demonstrated by touching each cornea with a stimulus.
  - (c) Oculocephalic (doll's eyes) responses are absent. If the patient's neck cannot be manipulated, oculovestibular reflex testing can be used instead.
  - (d) Oculovestibular (caloric) responses are absent. The procedure involves elevation of the head to 30 degrees above horizontal, observation of the tympanic membrane to ensure an absence of wax and ability of the stimulus to reach the tympanum, and instillation of at least 50 ml of ice water on one side. Movement of the eyes should be absent during the 1 minute of observation. Repetition of the procedure in the opposite ear occurs with a minimum of five minutes delay between sides.
  - (e) There is absence of facial muscle movement to a noxious stimulus, such as deep pressure to the temporomandibular joints and supraorbital ridge.
  - (f) There is absence of the pharyngeal and tracheal reflexes with no gag, cough, or reflex response to endotracheal suctioning is present.
- (3) Apnea-spontaneous respirations are absent.
- (a) Patient is hemodynamically stable.
  - (b) The procedure includes documentation of initial normocarbia (PaCO<sub>2</sub> 35-45 mmHg).
  - (c) The patient is preoxygenated on 100% oxygen >10 minutes to a PaO<sub>2</sub> >200 mmHg.
  - (d) An oximeter is placed and the ventilator is disconnected while oxygen is given through an intratracheal catheter.
  - (e) The patient is observed for any ventilator efforts for a minimum of 8-10 minutes, or until the oxygen saturation drops below 85% for >30 seconds, or until there is cardiovascular instability.
  - (f) If no respiratory movements are observed at 8 minutes, arterial blood is drawn for documenting of PaCO<sub>2</sub> level. A satisfactory apnea test will have, at conclusion, a PaCO<sub>2</sub> ≥ 60 mmHg or an increase of 20 mmHg from baseline.
  - (g) If the test at 8 minutes is inconclusive, but the patient is hemodynamically stable, another arterial blood gas can be drawn at 10-15 minutes.
  - (h) If oxygen saturation drops below 85% for >30 seconds during the apnea test, another attempt may be made with continuous positive airway pressure at 10 cm H<sub>2</sub>O and 100% O<sub>2</sub>, after patient is hemodynamically stable and has again been preoxygenated for >10 minutes.
- (4) Ancillary studies, such as EEG, cerebral angiography, nuclear scan, transcranial Doppler, may be performed at the discretion of the attending physician. These tests may be performed when apnea

testing cannot be performed adequately due to hemodynamic or cardiopulmonary instability or other factors to confirm brain death. Ancillary tests are not needed for the clinical diagnosis of brain death and cannot replace a neurological examination.

2. Time of death is the time of ABG result that supports apnea or time of ancillary study interpretation report.

**Brain Death Exam Checklist/Worksheet:**

**Prerequisites**

- Neuroimaging to support mechanism for irreversible brain damage
- 12 hours since insult
- Absence of CNS depressants for 5 half-lives or drug level
- Absence of neuromuscular blockade
- Laboratories that would not confound exam (pH, BUN, Na, TSH, etc)
- Normothermic  $\geq 36^{\circ}\text{C}$  for at least 24 hours
- SBP  $\geq 100$  mmHg

**Exam**

- Call patient, tap patient (can be with noxious stimuli)
- Cold Calorics – first ear, 50-60 ml, 60 seconds observation
- Noxious stimuli to all extremities (proximal and distal) and face
- Pupillary reflex
- Corneal Reflex
- Occulocephalic Reflex
- Cough Reflex
- Gag Reflex
- Cold Calorics – second ear,  $\geq 5$  minutes after first ear, 50-60 ml, 60 seconds observation

**Apnea testing**

- Ensure patient is on minimal ventilator settings (Low FiO<sub>2</sub>, PEEP 5)
- Ensure patient is hemodynamically stable with or without vasopressors
- Preoxygenation on 100% FiO<sub>2</sub> for  $\geq 10$  minutes
- Pretest ABG: \_\_\_\_\_
- Disconnect ventilator from ETT and place oxygen tubing inside ETT to carina, turn O<sub>2</sub> to 6L
- Observe for chest rise (without coverings) for 8-10 minutes, observe for full 10 minutes if stable
- Draw ABG at 8 minutes and 10 minutes
- 8 minute ABG: \_\_\_\_\_
- 10 minute ABG: \_\_\_\_\_
- Abort of SaO<sub>2</sub>  $<85\%$  for  $>30$  seconds or if hemodynamically unstable (SBP  $< 100$ mmHg, can adjust vasopressors)

Time of Death: \_\_\_\_\_

**H. ATTACHMENTS:**

None

**I. REFERENCES:**

None

**J. SEARCH WORDS:**

None

**K. ENFORCEMENT:**

Violations of this policy or associated procedures may result in appropriate disciplinary measures in accordance with University By-Laws, General Rules of Conduct for All University Employees, applicable collective bargaining agreements, the University of Connecticut Student Code, other applicable University Policies, or as outlined in any procedures document related to this policy.

**L. STAKEHOLDER APPROVALS:**

On File

**M. COMMITTEE APPROVALS:**

Medical Board – November 8, 2022

**N. FINAL APPROVAL:**

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|--|-----------------------------------|
| <p>1. <u>Bruce T. Liang, MD (Signed)</u><br/>Bruce T. Liang, MD<br/><b>Interim Chief Executive Officer &amp; EVP for Health Affairs<br/>Dean, School of Medicine</b></p> | <p><u>01/04/2023</u><br/>Date</p> |
| <p>2. <u>Anne Horbatuck (Signed)</u><br/>Anne D. Horbatuck, RN, BSN, MBA<br/><b>Clinical Policy Committee Co-Chair</b></p>   | <p><u>01/06/2023</u><br/>Date</p> |
| <p>3. <u>Scott Allen, MD (Signed)</u><br/>Scott Allen, MD<br/><b>Clinical Policy Committee Co-Chair</b></p>  | <p><u>12/22/2022</u><br/>Date</p> |
| <p>4. <u>Caryl Ryan (Signed)</u><br/>Caryl Ryan, MS, BSN, RN<br/><b>Chief Operating Officer, JDH<br/>VP Quality and Patient Services &amp; Chief Nursing Officer</b></p> | <p><u>01/03/2023</u><br/>Date</p> |

**O. REVISION HISTORY:**

Date Issued: 2/86

Date Revised: 11/88, 11/91, 8/98, 9/00, 7/02, 9/11, 2/18, 12/22

Date Reviewed: 3/94, 5/97, 7/05, 3/09, 7/14, 6/17