



Rancho Los Amigos National Rehabilitation Center

ADMINISTRATIVE POLICY AND PROCEDURE

SUBJECT: DECLARATION OF BRAIN DEATH

Policy No.: B866
Supersedes: March 11, 2011
Revision Date: June 7, 2016
Page: 1 of 5

PURPOSE

The purpose of this policy is to govern the process for determining brain death at Rancho Los Amigos National Rehabilitation Center.

POLICY STATEMENTS

- An individual, who has sustained irreversible cessation of all functions of the entire brain, including the brain stem, is dead. A determination of death must be made in accordance with accepted medical standards.
- When an individual is pronounced dead by determining that the individual has sustained an irreversible cessation of all functions of the entire brain, including the brain stem, there shall be independent confirmation by another physician as required by California law.
- Determination of brain death shall be limited to qualified physicians acting in conformity with the procedures set forth below.
- The dated and timed documentation of the independent confirmatory examination will be the official pronouncement of death in the medical record.

PHYSICIAN QUALIFICATIONS

I. Declarants

Attending physicians in the Department of Neurology and Neurosurgery are qualified to make the determination of brain death. Neurology and Neurosurgery residents may complete the first exam if they are licensed in the State of California and deemed competent to perform the brain death examination through appropriate departmental procedures. The final exam must be performed by an attending physician in the Department of Neurology and Neurosurgery.

II. Physician Disqualification

Neither the physician making the determination of brain death nor the physician making the independent confirmation may participate in procedures for the removal or transplanting of organs after death.

PROCEDURES**I. DIAGNOSTIC CRITERIA FOR CLINICAL DIAGNOSIS OF BRAIN DEATH****A. Prerequisites:**

1. Clinical or neuroimaging evidence of an acute CNS catastrophe that is compatible with the clinical diagnosis of brain death.
2. Exclusion of complicating medical conditions that may confound clinical assessment
3. No drug intoxication or poisoning
4. Core temperature greater than or equal to 32° C (90 °F)

B. The three cardinal findings in brain death are coma or unresponsiveness, absence of brainstem reflexes, and apnea.

1. Coma or unresponsiveness- no cerebral motor response to pain in all extremities (nail-bed pressure and supraorbital pressure). Absence of brainstem reflexes
 - a. Pupils:
 - no response to bright light
 - size: midposition (4mm) to dilated (9mm)
 - b. Ocular movement:
 - No oculocephalic reflex (testing only when no fracture or instability of the cervical spine is apparent)
 - No deviation of the eyes to irrigation in each ear with 50ml of cold water (allow 1 minute after injection and at least 5 minutes between testing on each side).
 - c. Facial sensation and facial motor response
 - No corneal reflex to touch with a throat swab
 - No jaw reflex
 - No grimacing to deep pressure on nail bed, supraorbital ridge, or temporomandibular joint
 - d. Pharyngeal and tracheal reflexes
 - No response after stimulation of the posterior pharynx with tongue blade
 - No cough response to bronchial suctioning
2. Apnea- testing performed as follows:
 - a. Prerequisites:
 - Core temperature greater than or equal to 36.5° C or 97° F
 - Systolic blood pressure greater than or equal to 90 mmHg
 - Euvolemia. *Option:* positive fluid balance in the previous 6 hours
 - Normal *PCO₂* *Option:* arterial *PCO₂* greater than or equal to 40 mmHg
 - Normal *P0₂* *Option:* preoxygenation to obtain arterial *P0₂* greater than or equal to 200 mmHg
 - b. Connect a pulse oximeter and disconnect the ventilator.
 - c. Deliver 100% O₂, 6 L/min, into the trachea. *Option:* place a cannula at the level of the carina.
 - d. Look closely for respiratory movements (abdominal or chest excursions that produce adequate tidal volume.

- e. Measure arterial PO₂, PCO₂, and pH after approximately 8 minutes and reconnect the ventilator.
- f. If respiratory movements are absent and arterial PCO₂ is greater than or equal to 60 mmHG (*option*: 20 mmHG increase in PCO₂ over a baseline normal PCO₂ the apnea test result is positive (i.e., it supports the diagnosis of brain death).
- g. If respiratory movements are observed, the apnea test result is negative (i.e., it does not support the clinical diagnosis of brain death), and the test should be repeated.
- h. Connect the ventilator if, during testing, the systolic blood pressure becomes less than or equal to 90 mmHg or the pulse oximeter indicates significant oxygen desaturation and cardiac arrhythmias are present; immediately draw an arterial blood sample and analyze arterial blood gas. If PCO₂ is greater than or equal to 60 mmHg or PCO₂ increase is greater than or equal to 20 mmHg over baseline normal PCO₂, the apnea test result is positive (it supports the clinical diagnosis of brain death); if PCO₂ is less than 60 mmHg or PCO₂ increase is less than 20 mmHg over baseline normal PCO₂, the result is indeterminate, and an additional confirmatory test can be considered.

C. Conditions That May Necessitate a Confirmatory Test

- Severe Facial Trauma
- Preexisting pupillary abnormalities
- Toxic levels of any sedative drugs, aminoglycosides, tricyclic antidepressants, anticholinergics, antiepileptic drugs, chemotherapeutic agents, or neuromuscular blocking agents.
- Sleep apnea or severe pulmonary disease resulting in chronic retention of CO₂.

D. Clinical Observations Compatible with the Diagnosis of Brain Death

These manifestations are occasionally seen and should not be misinterpreted as evidence for brainstem function.

- Spontaneous movements of limbs other than pathologic flexion or extension response
- Respiratory-like movements (shoulder elevation and adduction, back arching, intercostal expansion without significant tidal volumes)
- Sweating, blushing, tachycardia
- Normal blood pressure without pharmacologic support or sudden increases in blood pressure
- Absence of diabetes insipidus
- Deep tendon reflexes; superficial abdominal reflexes; triple flexion response
- Babinski reflex present

E. Confirmatory Laboratory Tests

Brain death is a clinical diagnosis. A repeat clinical evaluation at least 6 hours later is required by an attending Neurologist or Neurosurgeon. A confirmatory test is not mandatory but is desirable in patients in whom specific components of clinical testing cannot be reliably performed or evaluated. Any of the suggested confirmatory tests may produce similar results in patients with catastrophic brain damage who do not (yet) fulfill the clinical criteria of brain death. The following tests are in the order of most sensitive test first.

1. Conventional angiography
2. Electroencephalography
3. Transcranial Doppler ultrasonography
4. Technetium-99m hexamethylpropyleneamineoxime brain scan
5. Somatosensory evoked potentials

II. BRAIN DEATH DECLARATION: INFANTS AND CHILDREN

A. The diagnosis of brain death in children is based on the same principles used in adults. The three fundamental criteria for brain death (coma, apnea, and absent brain stem reflexes), when present, allow accurate diagnosis. The recommended observation period depends on the age of the patient and the laboratory tests used:

7 days to 2 months	2 examinations and EEGs 48 hours apart
2 months to 1 year	2 examinations and EEGs 24 hours apart; or 1 examination and an initial EEG showing ECS, combined with a radionuclide angiogram showing no CBF; or both
Older than 1 year	2 examinations 12-24 hours apart; EEG and isotope angiography optional

[Ad Hoc Task Force Guidelines (consisted of representatives from the Academy of Pediatrics, American Academy of Neurology, Child Neurology Society, American Neurological Association, American Bar Association, and the National Institute of Neurological Diseases and Communicative Disorders and Stroke)]

III. DIAGNOSIS WHEN A COMPLETE CLINICAL EXAMINATION CANNOT BE PERFORMED

- A. In the event that a complete clinical brain death examination cannot be performed, a diagnosis of brain death may be made only after:
1. **Determination** of brain death by an objective test or study of cerebral blood flow that shows no intracranial perfusion or a study that shows absence of brain activity. The results of the study must be interpreted by a qualified Neurology or Neurosurgery attending physician and documented as diagnostic of brain death.
 2. **Confirmation** of brain death by two clinical examinations, performed by two independent qualified physicians, as complete as circumstances allow, adhering to the time sequence above, and adequate to confirm that there is no contraindication to the determination.

IV. DOCUMENTATION

- A. Etiology and irreversibility of condition
- B. Absence of brainstem reflexes
- C. Absence of motor response to pain
- D. Absence of respiration with PCO₂ greater than or equal to 60 mmHg
- E. Justification for confirmatory test and result of confirmatory test
- F. Repeat neurologic examination.

V. FAMILY ACCOMMODATION

- A. Family/next of kin are provided a quiet place to gather during this time of loss. A variety of support services (e.g. chaplain, social work) are available, as needed, to allow for successful adjustment, coping and grieving. The family will be provided a reasonably brief period of accommodation from the time a patient is declared brain dead through discontinuation of cardiopulmonary support.
- B. During this period, the hospital is required to continue only previously ordered cardiopulmonary support. No other medical intervention is required.
- C. A reasonably brief period means an amount of time afforded to gather family or next of kin at the patient's bedside.
- D. Reasonable efforts will be made to accommodate special religious or cultural practices and concerns.
- E. The hospital will determine what is "reasonable" based on the needs of other patients and prospective patients in urgent need of care.
- F. A hospital subject to this section shall provide the patient's legally recognized health care decision maker, if any, or the patient's family or next of kin, if available, with a written statement of the policy described in subdivision (a), upon request, but no later than shortly after the treating physician has determined that the potential for brain death is imminent.

VI. ORGAN AND TISSUE DONATION

- A. Rancho Los Amigos National Rehabilitation Center recognizes the patient may have indicated a desire to provide organ and/or tissue donation, or the family/significant other may want to consider this gift.
- B. Rancho contracts with OneLegacy, a member of the United Network for Organ Sharing (UNOS). In accordance with California Health and Safety Code Section 7184 and Rancho's Administrative Policy B515- *Organ/Tissue Donor Protocol*, the Organ or Tissue Procurement Agency must be notified of all deaths and imminent deaths within one hour.
- C. The physician will not discuss organ and tissue donation prior to the declaration of brain death.
- D. Please refer to the above listed policy for details concerning organ donation.

References:

- American Academy of Pediatrics. (1987). Guidelines for the determination of brain death in children. *Pediatrics*, 80, No.2. Retrieved from <http://pediatrics.aappublications.org/cgi/content/abstract/80/2/298>
- American Academy of Neurologists (1995). Summary Statement, Practice Parameters: Determining Brain Death in Adults. *Neurology* 1995; 45:191201914
- Rancho Los Amigos National Rehabilitation Center's Administrative Policy B515- *Organ/Tissue Donor Protocol*
- State of California Health and Safety Code, Sections: 1254.4, 7180, and 7181

Written by: Caren Alwin, RN, Amytis Towfighi, MD, Susan Shaw, MD, David Millett, MD, Mindy Aisen, MD March 2011

Approved by: MEC, February 23, 2011; EC March II, 2011