LOMA LINDA UNIVERSITY
MEDICAL CENTER

# LOMA LINDA UNIVERSITY MEDICAL CENTER

## OPERATING POLICY

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| **CATEGORY:** | CLINICAL MANAGEMENT | **CODE:** | M-22 |
| | | **EFFECTIVE:** | 11/2018 |
| **SUBJECT:** | DETERMINATION OF DEATH BY NEUROLOGIC CRITERIA | **REPLACES:** | 08/2015 |
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1. Definition

   Death has occurred when there is irreversible cessation of all functions of the entire brain, including the brain stem. A determination of death shall be made using either of two criteria:

   1.1 Cardiopulmonary criteria - In the absence of artificial cardiopulmonary support, death is determined by the prolonged absence of spontaneous circulatory and pulmonary function.

   1.2 Neurologic criteria - In the presence of artificial cardiopulmonary support, death is determined using neurologic criteria as defined in Guidelines M-22.A.

2. Any licensed physician may determine that death has occurred using cardiopulmonary criteria.

3. Any licensed physician may make an initial determination of death using the defined neurologic criteria (reference attachment M-22.A).

   3.1 Confirmation by a second licensed physician shall be required (California Health and Safety Code §7181) when neurologic criteria are used to determine death. This confirmation shall be documented on the medical record.

   3.2 Since different criteria exist for the determination of death by neurologic criteria in infants and children, at least one of the examinations shall be done by a pediatric neurologist or pediatric neurosurgeon when the patient in question is an infant or child.

   3.3 When an attending physician is unable to achieve one or more metabolic thresholds on a patient who appears to be clinically brain dead, the attending physician may call together an ad hoc committee consisting of a minimum of 2 intensivists, 1 neurologist and 1 medical ethicist to review the case and recommend an appropriate course of action to the attending physician.

   3.4 In the event that neither of the physicians making the determination of death by neurologic criteria is the attending physician (or designee), the attending physician (or designee) shall be notified of the determination of death by neurologic criteria.

   3.5 Neither the physician making the initial determination of death by neurologic criteria nor the concurring physician shall participate in any procedure involving removal of and/or transplantation of any part of the deceased pursuant to the Uniform Anatomical Gift Act and CA Health and Safety Code 7150.65.

4. Documentation

4.1 The physicians making the determination of death shall document this in the medical record of the deceased.

4.2 A licensed physician shall complete a death certificate unless the case is subject to coroner's inquiry (California Government Code § 27491), in which case the death certificate shall be completed by the coroner.

5. Continuation of organ support after the determination of death by neurologic criteria:

When death has been determined by neurologic criteria, artificial cardiopulmonary support of the body of the deceased shall be discontinued as soon as the appropriate organ procurement agency (reference Policy Organ/Tissue Donation From Patients Determined Deceased By Neurologic Criteria (Q-10)) has been notified, and a decision not to donate organs has been made.

5.1 When the organ procurement agency has determined that the deceased is a potential donor of transplantable organs or tissue, artificial support measures shall be continued until an attempt has been made to obtain consent for retrieval of organs or tissue.

5.2 When the organ procurement agency has determined that the deceased is not a potential donor of organs or tissue, or the family is unwilling to give consent for organ donation, artificial support shall be discontinued automatically. Out of compassion for the family of the deceased, artificial support may be continued for a brief period to accommodate, as possible, arrival of the family and observance of their religious and cultural practices.

a. During this period of family accommodation, no attempt at cardiopulmonary resuscitation shall be made if cardiac arrest occurs and no increase in level of organ support shall be instituted. The decedent's family shall be so notified. "Do not resuscitate" and other appropriate orders shall be entered in the chart. These procedures apply only in the circumstances described in 5.2.

b. If family members request that this period of accommodation be extended, the basis for the determination of death shall be reviewed with them and spiritual and psychological support shall be given. A copy of the statement (M-22.B) shall be given upon request.

NOTE: In certain circumstances, Clinical Ethics consultation or legal consultation may be required.

APPROVERS: Hospital Executive Leadership, LLUMC Chief Executive Officer, LLUMC Chief Nursing Officer, LLUMC Ethics Committee, LLUMC Medical Staff President and Chair of MSEC

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## GUIDELINES

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| **CATEGORY:** | CLINICAL MANAGEMENT | **CODE:** | M-22.A |
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Death by neurologic criteria is distinct and different from other neurologic conditions such as irreversible coma and the vegetative state. This distinction is vital for the physician who must make a judgment in this most sensitive area of practice, and for all other professionals involved in the care of critically or terminally ill patients.

**DEFINITIONS:** Death by neurologic criteria (sometimes called brain death or cerebral death) is the absence of clinical brain function, and is characterized by coma or unresponsiveness, absence of brain stem reflexes, and apnea.

The term irreversible coma has been used in the past to refer to states of prolonged unconsciousness.

A vegetative state is a clinical condition of complete unresponsiveness to the environment, accompanied by sleep-wake cycles with either complete or partial preservation of hypothalamic and brain-stem autonomic functions (such as respiration, temperature regulation, and blood pressure regulation).

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1. Prerequisites for determination of death by neurologic criteria:

   1.1 The proximate cause of death by neurologic criteria must be known and must be demonstrably irreversible. There must be:

   a. Clinical or neuroimaging evidence of an acute central nervous system catastrophe that is compatible with the clinical diagnosis of death by neurologic criteria,

   b. Exclusion of medical conditions that may confound clinical assessment, e.g. severe electrolyte, acid-base, or endocrine disturbance,
      1) Acceptable metabolic thresholds include:
         a) pH, arterial or venous: 7.35 – 7.45
         b) Na mMol/L: 135 – 160
         c) K mMol/L: 3.5 – 5
         d) Mg mMol/L: ≥ 0.6
         e) Phos mMol/L: ≥ 0.8
         f) Glucose mg/dL: 80 – 200

c. No confounding drug intoxication or poisoning that might simulate coma, and
   1) Acceptable sedation clearance timeline/threshold includes:
      a) 5 x estimated clearance half-life
      b) Drug levels when appropriate: plasma levels below the therapeutic range
      c) For neuromuscular blockers, 4/4 on train-of-4 testing
      d) Blood alcohol <0.08%
      e) Barbiturate level <10mcg/mL

   NOTE: Consult pharmacist for assistance as needed

d. A core temperature of greater than 36$^{o}$ C (96.8$^{o}$ F), and systolic blood pressure of 100 mm Hg or greater.

2. Criteria for determination of death by neurologic criteria:

2.1 Determinations of death by neurologic criteria will be in conformity with California statute (California Health & Safety §7180, 7181, 7182).

2.2 Determinations of (1) coma (or unresponsiveness), (2) absence of brain stem reflexes, and (3) apnea will be made using accepted clinical criteria, and will be documented in the chart. In the event of an iatrogenic barbiturate coma, death by neurologic criteria can be determined by (a) coma of known neurologic etiology plus one of the following: (b) documented barbiturate level that would normally allow patients to be easily arousable, or (c) evidence of absent cerebral circulation by a cerebral blood flow study. Criteria used will be clearly documented in the medical record. When the apnea challenge test is used as part of determining brain death, it must be done by an attending physician.

2.3 Ancillary tests can be used when uncertainty exists about the reliability of parts of the neurologic examination or when the apnea test cannot be performed. (Ref: Evidence-based guideline update: Determining Brain Death in Adults. Report of the Quality Standards Subcommittee of the American Academy of Neurology. Wijdicks E, Vareles P, Gronseth G, Greer D. Neurology June 8, 2010, Vol 74, No 23, 1911-1918).
   a. Only one ancillary test needs to be performed
   b. Recommended ancillary tests:
      1) Cerebral angiogram
      2) EEG, brain death protocol
      3) Nuclear scan

2.4 There will be documentation that coma has persisted for a minimum of:
   a. 24 hours between onset of coma and 1$^{st}$ brain death examination
   b. 2 hours between 1$^{st}$ and 2$^{nd}$ brain death examinations

2.5 Electrocerebral silence on the EEG and absence of cerebral circulation may be used as confirmatory tests, but are not required for the determination of death by neurologic criteria.

2.6 The time of death to be recorded is the time of the confirming (second physician s) examination, as required by California statute (California Health & Safety Code §7181).

2.7 The criteria used for determination of death by neurologic criteria for pediatric patients shall be consistent with: Guidelines for the determination of brain death in infants and children: An update of the 1987 Task Force recommendations. Nakagawa, T; Ashwal, S; Mathur, M et al. Critical Care Medicine 2011; 39(9): 2139-2155.)) (link).

Dear Family,

We regret to inform you that your family member _____ has been declared brain dead because tests show that their brain is no longer working and there is no chance of recovery. Cardiopulmonary (heart and lung) support that is being provided will be stopped, as continuing such will not lead to any improvement.

The medical and nursing staff will set aside a brief time, prior to removing the cardiopulmonary support, for you and any other desired family members to gather to say your good-byes according to your own personal religious beliefs and preferences as much as reasonably possible.

During this time we would like you to be aware that no attempt at cardiopulmonary resuscitation (CPR) will be made if the heart stops, and no new organ support treatment will be started.

Please accept our sincerest condolences at this very difficult time.

Sincerely,

Clinical and Administrative Staff of Loma Linda University Medical Center