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The Alliance
LEADERSHIP IN ORGAN DONATION AND TRANSPLANTATION

EDUCATION CORNER

Brain Death Pronouncement

Best practices in pronouncing brain death include following state legislative requirements and the American Academy of Neurology's (AAN) practice parameters, as well as ensuring practice is following hospital policy.

(Find your state's determination of death act by visiting the organ donation toolbox and select the Legal & Regulatory Section.)

AAN's (2010) Practice Recommendations Include

1. Clinical evaluation of brain death (prerequisites)

A) Establish irreversible and proximate cause of coma by history, examination, neuro-imagining, and laboratory testing. Exclude the presence of a CNS-depressant drug effect, ensure no recent administration or continued presence of neuromuscular blocking agents, and no severe electrolyte, acid-based, or endocrine disturbance.
B) Correct hypothermia (to at least 36 ºC) and normalize BP to a minimum SBP of 100 mm Hg.

2. Clinical evaluation of brain death (neurological assessment)

A) Coma - patient must lack all evidence of responsiveness, no eye opening or movement, no response to noxious stimuli other than spinal reflexes, absence of all brainstem reflexes: no pupillary response, no response to oculocephalic and oculovestibular testing, no corneal reflex, absence of pharyngeal and tracheal reflexes, and apnea to a CO_2 challenge (see below).

3. Ancillary Testing

AAN recommends ancillary testing (EEG, SPECT, TCD, Cerebral Angiography) **only** when the clinical diagnosis of brain death is confounded or cannot be made with certainty, or when the apnea testing cannot be performed/ completed. Ancillary tests cannot replace a neurological exam, and disparities between tests can exist, leading to false positives, particularly if ancillary tests are performed without a clinical exam.

4. Documentation

Determination, date and time of brain death must be documented and signed and must follow state law requirements.

***** Throughout brain death testing and particularly when communicating the outcomes of the clinical exam, it is important that the physician provide the family with clear communication explaining the patient's death. Conflicting messages lead to confusion and anger with the grieving family. Donation should not be part of this communication, as the timing can lead to a perceived conflict of interest.*****

Summary Points:

- *State legislation provides guidance on requirements for brain death determination.*
- *The AAN provides best practice recommendations for the determination process.*
- *Ancillary tests are not required by legislation, but should be utilized only when the clinical examination cannot be fully performed or confounders cannot be corrected.*
- *Apnea testing is not an ancillary test - it is an essential part of the clinical evaluation, testing brainstem function.*

References:
Quality Standards Subcommittee of the American Academy of Neurology (2010). Evidence-based guideline update: Determining brain death in adults. Neurology, 74, 1911-1918. doi:10.1212/WNL.0b013e3181e242a8

OrganDonationToolbox – organdonationalliance.org/organ-donation-toolbox

Neurocritical Care Society – Brain Death Toolkit

Apnea Testing (taken from the AAN Practice Parameters, 2010)

Apnea Testing Prerequisites

a) Normothermia ≥ 36 ºC
b) Normotension ≥ 100 mm Hg
c) Absence of hypoxia

Apnea Testing Steps

1. Preoxygenate for 10 mins at 100% O_2 to PaO_2 > 200 mm Hg.
2. Reduce minute ventilation to establish eucapnia.
3. Reduce PEEP to 5 cm H_2O.
4. If pulse ox remains > 95%, obtain baseline blood gas.
5. Maintain continuous pulse ox and disconnect ventilator.
6. Deliver 100% O_2 at 4-6 L/min to the level of the carina.
7. Observe closely for respiratory movements for 8-10 minutes.
8. Measure arterial PO_2, PCO_2, and pH after 10 minutes and reconnect ventilator.
9. If respiratory movements are absent and arterial PCO_2 ≥ 60 mm Hg (or 20 mm Hg increase), apnea test is **positive** (i.e. **supports** brain death).
10. If respiratory movements are observed, the apnea test result is negative (ie. it does not support the clinical diagnosis of brain death).
11. Abort test and reconnect the ventilator if SBP ≤ 90 mm Hg, pulse ox < 85% x 30 seconds, or cardiac arrhythmias occur. Immediately draw an ABG and analyze.

Editor: Hedi Aguiar RN, MSN, Senior Director of Programs, The Alliance, haguiar@odt-alliance.org. *ODTA/EC/BrainDeathDeclaration/101717*