Determination of Death by Neurological Criteria

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PRE-EVALUATION

Patient is suspected to meet criteria for neurological death[1,2]
- Patient has irreversible cessation of all functions of the entire brain, including the brain stem
- Cerebral imaging correlates with suspicion of brain death

→ Stop all medications that may interfere with the diagnosis of brain death, per discretion of Intensivist/Neurologist

→
- Conduct a multidisciplinary family meeting to discuss suspected brain death
- Inform nursing and initiate consults for assistance and counseling as appropriate
  - Social work
  - Chaplain
- If questioned/opposed by the patient's representative/family, contact Administration, Ethics, Risk Management, and Legal services as needed[3]
- Physician and clinical team must be aware of culture and trust issues raised by the family in any discussions

EVALUATION (to be performed by Attending Intensivist, Neurologist, or Neurosurgeon)

Potential brain death, notify:
- LifeGift[4]
- Dayshift ICU Nurse Manager/Nursing Off-Shift Administrator (NOSA)
- Hospital Administrator

→
- Assess for **absence** of the following:
  - Pupil reaction to light in both eyes
  - Corneal reflexes
  - Ocular movement with head turning (oculocephalic reflex) when no apparent cervical spine injury exists and ocular movements after caloric testing with ice water (oculovestibular reflex)
  - Bulbar function (jaw reflex)
  - Oropharyngeal reflex (gag and cough reflex)
  - Pain reflex
- Perform apnea test, unless contraindicated (see Appendix D)
  Note: Apnea test should not be performed if:
  - Patient has a comorbid condition that prevents demonstration of spontaneous respiratory effort **or**
  - Patient would be placed at undue risk to develop cardiac arrest

→ See Page 2 for further testing

[1] See Appendix A for Death by Neurological Criteria Checklist
See Appendix B for Neurological Criteria for Brain Death

[2] The following conditions may interfere with the clinical diagnosis of brain death:
- Severe facial trauma
- Pre-existing pupil abnormalities
- Toxic levels of aminoglycosides, tricyclic antidepressants, anticholinergics, antiepileptic drugs or chemotherapeutic agents
- Anesthetic levels of opiates and sedatives
- Neuromuscular blocking medications
- Sleep apnea or severe pulmonary disease resulting in chronic retention of CO_2
- Therapeutic hypothermia treatment
- Mydriatic medications

[3] The family or any treating physician may request an Ethics consult under Clinical Ethics Consultation Policy (MD Anderson Institutional Policy # CLN0461)

[4] LifeGift should be notified at time of death, or when death is known to be imminent to make an independent assessment of suitability [Refer to Determination of Medical Appropriateness Policy (MD Anderson Institutional Policy # CLN0557)]

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Department of Clinical Effectiveness V5
Approved by the Executive Committee of the Medical Staff on 09/15/2020

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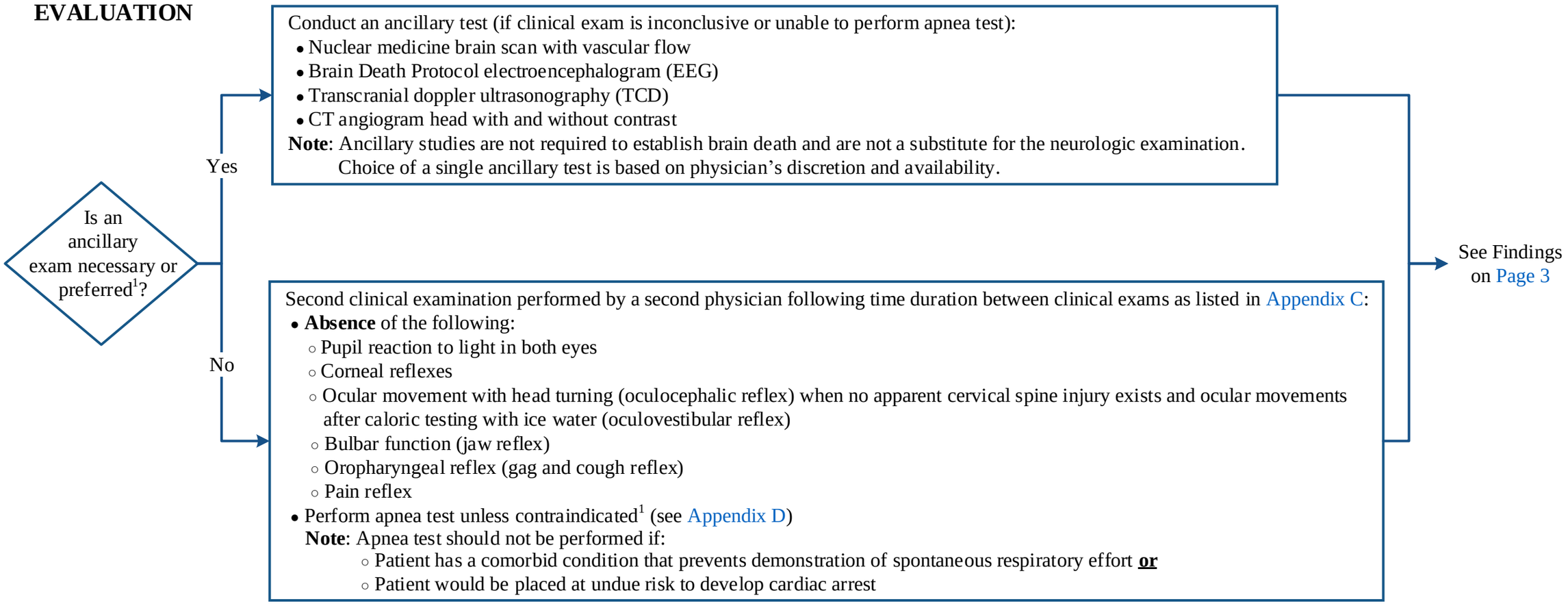
TESTING FOLLOWING EVALUATION



[1] The following conditions may interfere with the clinical diagnosis of brain death:
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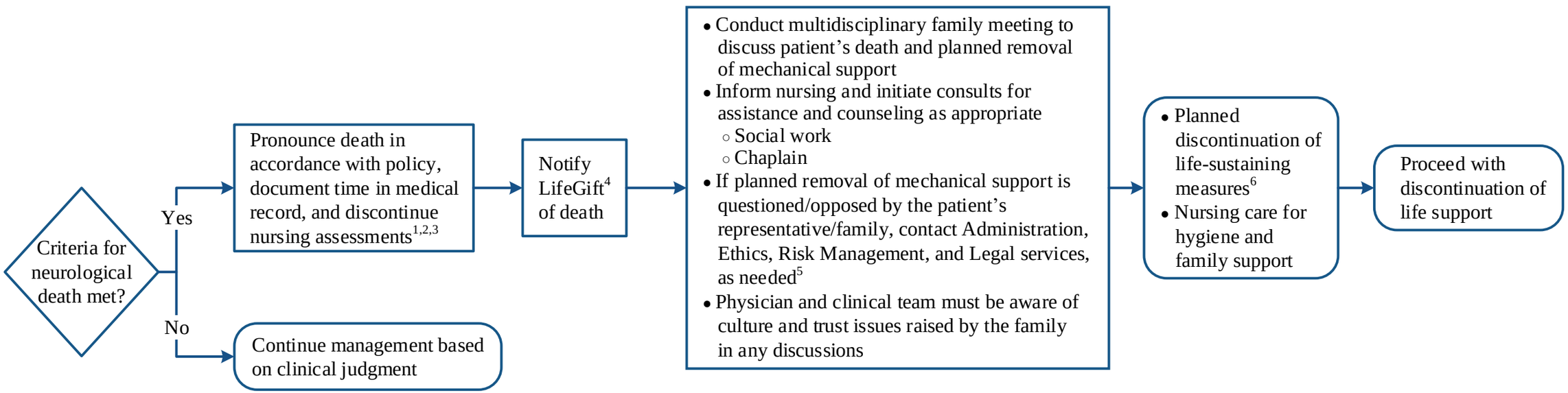
FINDINGS **ACTIONS**



[1] If the practitioner is unwilling to pronounce the patient's death, the Medical Director and/or the appropriate hospital Executive Officer shall be notified [Refer to Accommodating Closely Held Personal and/or Religious Beliefs Policy (MD Anderson Institutional Policy # ADM0260)]
[2] See Care of the Deceased Policy (MD Anderson Institutional Policy # CLN1084)
[3] See Pronouncement of Death by an Advanced Practice Provider Policy (MD Anderson Institutional Policy # CLN0509)
[4] LifeGift should be notified at time of death, or when death is known to be imminent to make an independent assessment of suitability [Refer to Determination of Medical Appropriateness Policy (MD Anderson Institutional Policy # CLN0557)]
[5] The family or any treating physician may request an Ethics consult under Clinical Ethics Consultation Policy (MD Anderson Institutional Policy # CLN0461)
[6] The time between pronouncement of death and discontinuation of mechanical support should not exceed 6 hours. Under rare circumstances, the time period may be extended by 24 - 48 hours on a case by case basis, following consultation with Legal services.

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APPENDIX A: Death by Neurological Criteria Checklist

☐ **Pre-Evaluation**

☐ **Family Meeting #1**
Attendees/discussed with:
_____
_____
_____
_____

☐ **Notify LifeGift of potential Brain Death**

☐ **Clinical Examination #1**

☐ **Apnea Testing (Pediatric Considerations)**

or

☐ Apnea test aborted
Reason:
_____
_____
_____
_____

☐ **Ancillary testing OPTIONAL** (only 1 needs to be performed; to be ordered only if clinical examination cannot be fully performed due to patient factors, or if apnea testing inconclusive or aborted)

☐ **Documentation of all of the above in the Medical Record**

Name of physician and signature (Exam 1)

_____

Date & time

☐ **Clinical Examination #2**

☐ **Apnea Testing (Adult and Pediatric Considerations)**

or

☐ Apnea test aborted
Reason:
_____
_____
_____

☐ **Continued Clinical Management**

or

☐ **Pronounce Death in accordance with policy**
☐ Document time in medical record

☐ **Notify LifeGift of Death**

☐ **Family Meeting #2**
Attendees/discussed with:
_____
_____
_____

☐ **Planned removal of Life Support**

or

☐ **Organ Donation Procedures through LifeGift**

☐ **Documentation of all of the above in the Medical Record**

Name of physician and signature (Exam 2)

_____

Date & time

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APPENDIX B: Physical Criteria Necessary to Accompany Determination of Neurologic Death

All of the following physical criteria must be met:

- Patient older than seven (7) days of age
- Rule out drug intoxication and reversible metabolic conditions that may obscure brain function; patient needs to be off all sedative medications or medications that reduce brain metabolic rate (*e.g.*, propofol, fentanyl, midazolam, barbiturates, etc.) which might obscure the exam
- Patient's body temperature > 36° C (96.8 ° F)
- Systolic blood pressure (SBP):

Adults and children ≥ 10 years old	SBP ≥ 100 mmHg
Children 1-9 years old	SBP > [70 + (2 x age in years)] mmHg
Infant < 1 year old	SBP > 70 mmHg
Newborns < 28 days old	SBP > 60 mmHg

APPENDIX C: Minimum Time Duration Between Clinical Exams

Age	Hours Between Examination
Term birth (37 weeks gestation) – 1 month	24
1 month – 18 years	12
> 18 years	6

Per American Academy of Pediatrics (AAP) and American Academy of Neurology (AAN) Guidelines

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APPENDIX D: Conducting Apnea Test[1]

Step 1:

A. In adults, adjust vasopressors to a systolic blood pressure (SBP) ≥ 100 mmHg.
In children, if hemodynamically unstable prior to or during apnea test, adjust vasopressor support to acceptable mean arterial pressure for age.

Then:

B. Give patient 100% oxygen for at least 10 minutes prior to starting the test. Manage ventilator rate to achieve $PaCO_2$ 45 mmHg. If not achievable, abort apnea test.

Step 2:

Obtain baseline arterial blood gases (ABGs) then disconnect the patient from the ventilator[1,2].

Step 3:

Once disconnected, insert oxygen source into endotracheal tube (ETT), and give patient oxygen at flow rate of 6 L/minute (loose fitting catheter through ETT for children).

Step 4: Observation/Evaluation

A. If patient exhibits any of the following: hypoxia, arrhythmia, or hypotension (SBP persistently < 90 mmHg in adults and children 10 years of age or older despite adjustment of vasopressors; for younger children use Appendix B for blood pressure parameters). Abort test immediately and draw ABGs[2].

B. If no symptoms as listed in 'A', continue observation for required time period.

C. Observe adult and pediatric patients carefully for respiratory effort for ten (10) minutes. Draw ABG's at the end of the observation time period and review results[2]:

Observations	Evaluation
Unable to complete due to physical condition	→ Continue with clinically appropriate management
Respiratory movements absent and the partial pressure of carbon dioxide ($PaCO_2$) ≥ 60 mmHg or increases by 20 mmHg from baseline normal[3] $PaCO_2$	→ Apnea test is satisfactorily completed and positive (supports the clinical diagnosis of brain death) → If not, result indeterminate; consider an additional ancillary test → If result is inconclusive and patient is hemodynamically stable, consider continuing the test for a longer period (11-15 minutes)[3]

[1] **Note: Responsible attending physician (Intensivist, and/or Neurologist/Neurosurgeon) present at the bedside immediately prior to disconnecting the patient from the ventilator and during the apnea test**
[2] Point of care testing is recommended
[3] Children: if the rise in $PaCO_2$ fails to reach 60 mmHg, perform the test again for a duration of 15 minutes

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SUGGESTED READINGS

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MD Anderson Institutional Policy # ADM0260 – Accommodating Closely Held Personal and/or Religious Beliefs Policy

MD Anderson Institutional Policy # CLN1084 – Care of the Deceased Policy

MD Anderson Institutional Policy # CLN0461 – Clinical Ethics Consultation Policy

MD Anderson Institutional Policy # CLN0557 – Determination of Medical Appropriateness Policy

MD Anderson Institutional Policy # CLN0509 – Pronouncement of Death by an Advanced Practice Provider Policy

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DEVELOPMENT CREDITS

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