

## **APPENDICES**

### **eAppendix 1. AAN Guideline Subcommittee Mission**

The mission of the Guidelines Subcommittee is to develop, disseminate, and implement evidence-based systematic reviews and clinical practice guidelines related to the causation, diagnosis, treatment, and prognosis of neurologic disorders.

The Guidelines Subcommittee is committed to using the most rigorous methods available within its budget, in collaboration with other available AAN resources, to most efficiently accomplish this mission.

### **eAppendix 2. AAN Guideline Subcommittee Members 2021-2023**

Alexander Rae-Grant, MD (Chair), John J. Halperin, MD (Vice-Chair), Matthew Bradford Bevers, MD, Lori L. Billingham, MD, Kelsey Cacic, MD, James Dorman, MD, Wendy S. Edlund, MD, Brittany Jade Farro, MSPAS, PA-C, Gary S. Gronseth, MD, FAAN, Le Hua, MD, Koto Ishida, MD, Mark Douglas Johnson, MD, Charles Kassardjian, MD, Mark Robert Keezer, MD, PhD, K.H. Vincent Lau, MD, Mia T. Minen, MD, Alison M. Pack, MD, Sonja Potrebic, MD, PhD, James J. Reese, Jr., MD, MPH, Sean C. Rose, Vishwanath Sagi, MD, Navdeep Sangha, MD, Nicolaos Scarmeas, MD, Niranjana N. Singh, MD, Sarah Tanveer, Benjamin D. Tolchin, MD, Shawniqua T. Williams Roberson, MD, Shuhan Zhu, MD

### **eAppendix 3. Questions for Each Recommendation to Determine the Cogency of the Rationale Supporting the Recommendation and the Strength of the Recommendation**

Round 1 and 2 Scheme

Assuming all premises in the rationale are true, does the recommendation logically follow from the premises?

Yes

No

Abstain

Do you agree that all axiomatic premises (PRIN\*) supporting the recommendation are true? (Where applicable)

Yes

No

Abstain

Do the inferred premises (INFER) logically follow from the other premises? (Where applicable)

Yes

No

Abstain

What is your judgment as to the balance between health-related benefits and health-related harms (risks/burdens) attained by compliance with the recommendation? Consider both the number of people who will be affected as well as the magnitude of the benefits and harms. Ignore cost and resource use in your assessment.

Benefits greatly outweigh harms

Benefits moderately outweigh harms

Benefits slightly outweigh harms

Benefits and harms are balanced or, harms outweigh benefits

How important are the outcomes that will be affected by the recommendation? If multiple outcomes are affected, rate the outcome with the highest importance.

Critically important

Very important

Mildly important

Not important or importance unknown

How much variation in patient preferences relative to complying with the recommendations do you expect (e.g., based on personal values, would many patients prefer not to comply with the recommendation)?

Minimal variation in preferences

Modest variation in preferences

Moderate variation in preferences

Large variation in preferences

Are the proposed interventions (including referrals, counseling discussions, etc, not just treatment interventions) discussed in the recommendation universally available?

Universally available

Usually available

Sometimes available

Not available

What is your judgment of the incremental cost (or resource use) to the patient relative to the net benefits of complying with the recommendation?

Cost is very small relative to the net benefits

Cost is small relative to the net benefits

Cost is high relative to the net benefits

Cost is very high relative to the net benefits

## **eAppendix 4. Revised Recommendation Voting Questions and Instructions**

### Round 3 through 6 Scheme

Asked once of all respondents:

The outcomes affected by these recommendations (the accurate determination of BD/DNC) are critically important.

Yes

No

Abstain

Among patients/families who accept the concept of BD/DNC, a large majority would prefer to increase the accuracy of the BD/DNC determination.

Yes

No

Abstain

Asked for all BD/DNC Determination questions, all others use prior scheme:

Assuming all premises in the rationale are true, does the recommendation logically follow from the premises?

Yes

No

Abstain

Do you agree that all axiomatic premises (PRIN\*) supporting the recommendation are true? (Where applicable)

Yes

No

Abstain

Do the inferred premises (INFER) logically follow from the other premises? (Where applicable)

Yes

No

Abstain

The action described in the recommendation will increase the likelihood of an accurate determination of BD/DNC with acceptable risk.

Agree

Somewhat agree

Neutral

Disagree

Abstain

In the ICU setting, the action described in this recommendation is feasible.

Agree

Somewhat agree

Neutral

Disagree

Abstain

The incremental cost (or resource use) relative to the increased accuracy in the determination of BD/DNC provided by following the action described in this recommendation is acceptable.

Agree

Somewhat agree

Neutral

Disagree

Abstain



## eAppendix 5. Brain Death/Death by Neurologic Criteria Checklist

Last Name	First name	DOB	MRN
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<b>PREREQUISITES FOR CLINICAL EXAMINATION</b>	
1. Ascertainment that the patient has sustained a catastrophic, permanent brain injury caused by an identified mechanism that is known to lead to brain death/death by neurologic criteria (BD/DNC) (7a and 13a)	<input type="checkbox"/> Yes <input type="checkbox"/> No Etiology:
2. Neuroimaging consistent with mechanism and severity of brain injury (in patients with primary posterior fossa injury, neuroimaging should demonstrate catastrophic supratentorial injury) (7c and 40)	<input type="checkbox"/> Yes <input type="checkbox"/> No
3. Observation for permanency a) ≥48 hours after acute brain injury (particularly hypoxic ischemic brain injury) for patients ≤2-years-old (8) b) ≥24 hours after hypoxic ischemic brain injury for patients ≥2-years-old (9b) c) A sufficient amount of time after brain injury to ensure there is no potential for recovery of brain function as determined by the evaluator based on the pathophysiology of the brain injury (9a)	<input type="checkbox"/> Yes <input type="checkbox"/> No Observation period (hours):
4. Core body temperature ≥ 36°C (for ≥24 hours for patients whose core body temperature has been ≤35.5°C [10a and b])	<input type="checkbox"/> Yes <input type="checkbox"/> No    Value:
5. Systolic blood pressure (SBP) ≥ 100 mm Hg and mean arterial pressure (MAP) ≥ 75 mm Hg for adults/SBP and MAP ≥ 5 <sup>th</sup> percentile for age in children (for patients on venoarterial ECMO: MAP ≥ 75 mm Hg for adults/MAP ≥ 5 <sup>th</sup> percentile for age in children) (11b and 11c)	<input type="checkbox"/> Yes <input type="checkbox"/> No    Value:
6. Exclusion of pharmacologic paralysis (if administered or suspected) through use of train-of-four stimulator or demonstration of deep tendon reflexes (12a)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not indicated
7. Drug levels for medications that may suppress central nervous system function are therapeutic/subtherapeutic (if available), pentobarbital level is <5 mcg/mL (if the patient received pentobarbital) and at least five half-lives for all other such drugs have passed (longer if there is renal/hepatic dysfunction or if the patient is obese or was hypothermic); (12a)	<input type="checkbox"/> Yes <input type="checkbox"/> No
8. Alcohol blood level ≤ 80 mg/dL (if clinically indicated) (12a)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not indicated
9. Toxicology screen (urine and blood) is negative (if clinically indicated) (12a)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not indicated
10. Exclusion of severe metabolic, acid-base, and endocrine derangements; (12a)	<input type="checkbox"/> Yes <input type="checkbox"/> No
11. A reasonable attempt has been made to inform the patient’s family of the plan to perform a BD/DNC examination (35a)	<input type="checkbox"/> Yes <input type="checkbox"/> No
<b>Prerequisite Summary (check one):</b>	
<input type="checkbox"/> All prerequisites were met	
<input type="checkbox"/> Unable to adequately correct metabolic derangements, but all other prerequisites were met, so will complete the neurologic examinations and apnea test(s) and if they are consistent with BD/DNC, will perform ancillary testing (12b)	
<input type="checkbox"/> One or more prerequisites were not met, so the evaluation was not completed	

<b>CLINICAL EXAM</b> (must be completed to fullest extent possible)	<b>Yes</b>	<b>No</b>	<b>Not tested</b>
12. Coma with unresponsiveness to visual, auditory, and tactile stimulation (15)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
13. Absent motor responses, other than spinally mediated reflexes, of the head/face, neck, and extremities after application of noxious stimuli to the head/face, trunk, and limbs (16a and 16b)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
14. Absent pupillary responses to bright light bilaterally (17)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Absent oculocephalic reflex (unless there is concern for cervical spine or skull base integrity) (18a)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Absent oculovestibular reflexes bilaterally (18b)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Absent corneal reflexes bilaterally (19)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Absent gag reflex (20)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Absent cough reflex (20)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Absence of sucking and rooting reflexes (patients <6-months only) (21)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Clinical examination results (check one):</b>			
<input type="checkbox"/> All elements of the <input type="checkbox"/> First <input type="checkbox"/> Second clinical exam were completed and findings were consistent with BD/DNC or all elements of the clinical exam except the oculocephalic reflex (18c) were completed and findings were consistent with BD/DNC			

A portion of the clinical exam other than the oculocephalic reflex could not be assessed safely or it was unclear whether observed limb movements were spinally mediated (note that even if a person does not have all limbs, painful stimulation can still be provided to the torso as close to the termination of the limb as possible, so this does not necessitate ancillary testing); however, the remainder of the test was performed to the fullest extent possible and responses were consistent with BD/DNC. (*Ancillary testing is required.*) (14a) Reason(s) for incomplete testing (check all that apply):

Anophthalmia;  Corneal trauma or transplantation;  Fracture of the base of the skull or petrous temporal bone;  High cervical cord injury  
 Ophthalmic surgery that influences pupillary reactivity;  Severe facial trauma;  Severe pre-existing neuromuscular disorder  
 Severe orbital or scleral edema or chemosis;  Limb movements that may be spinally mediated;  Other (specify):

One or more elements of the clinical exam were inconsistent with BD/DNC, so the patient does NOT meet criteria for BD/DNC (14b)

Attending name, signature, date, time.

APNEA TEST	Yes	No
<b>APNEA TESTING PREREQUISITES</b>		
21. No hypoxemia, hypotension, hypovolemia (23)	<input type="checkbox"/>	<input type="checkbox"/>
22. pH is normal (7.35-7.45) and PaCO <sub>2</sub> is normal (35-45 mm Hg) or if the patient is known to have chronic hypercarbia, PaCO <sub>2</sub> is at baseline if baseline is known or at estimated baseline if baseline is not known (arterial blood gases [ABGs] should be taken from both the distal arterial line and the ECMO postcircuit oxygenator for patients on venoarterial ECMO) (24a-b and 26)	<input type="checkbox"/>	<input type="checkbox"/>
	Value:	
23. PaO <sub>2</sub> > 200 mm Hg (25a)	<input type="checkbox"/>	<input type="checkbox"/>
	Value:	
<b>APNEA TESTING PERFORMED</b>	<input type="checkbox"/>	<input type="checkbox"/>
24. Apnea duration (minutes)		
25. Post-PaCO <sub>2</sub> value (mm Hg)		
26. Post-pH value		
<b>Final apnea testing results (check one):</b>		
<input type="checkbox"/> Apnea confirmed – no respirations and targets reached (pH < 7.30 and final PaCO <sub>2</sub> ≥ 60 mm Hg (8.0 kPa) and ≥ 20 mm Hg (2.7 kPa) above pre-apnea test baseline (≥ 20 mm Hg (2.7 kPa) above chronic baseline for patients known to have chronic hypercarbia whose baseline is known) ( <i>Ancillary testing is required if patient is known/suspected to have chronic hypercarbia but baseline PaCO<sub>2</sub> is not known.</i> ) (25f)		
<input type="checkbox"/> Apnea testing is inconclusive (could not be completed and no respirations and targets not reached) due to:		
<input type="checkbox"/> SBP < 100 mm Hg or MAP < 75 mm Hg or SBP/MAP < 5 <sup>th</sup> percentile for age in children		
<input type="checkbox"/> Progressive oxygen desaturation < 85%		
<input type="checkbox"/> Cardiac arrhythmia with hemodynamic instability (25h)		
<input type="checkbox"/> Apnea testing is negative – one or more spontaneous respirations were seen; findings are not consistent with BD/DNC (25g)		
Attending name, signature, date, time.		

ANCILLARY TESTING	
27. Reason(s) for ancillary testing (27b):	<input type="checkbox"/> Inability to correct metabolic derangements <input type="checkbox"/> Inability to complete all clinical tests (e.g., fracture of the cervical spine, skull base, orbits, face) <input type="checkbox"/> Inability to complete apnea test due to risk of cardiopulmonary decompensation or inability to interpret PaCO <sub>2</sub> level in a patient with chronic hypoxemia for whom chronic baseline is unknown <input type="checkbox"/> Uncertainty regarding interpretation of spinally vs. cerebrally mediated motor responses <input type="checkbox"/> Required by hospital/state guidelines
28. Type of ancillary testing performed (29-31)	<input type="checkbox"/> Conventional 4-vessel catheter angiography (digital subtraction angiography) <input type="checkbox"/> SPECT radionuclide perfusion scintigraphy or planar radionuclide angiography <input type="checkbox"/> Transcranial doppler ultrasonography (adults only)
<b>Final ancillary testing results (check one):</b>	
<input type="checkbox"/> Ancillary testing results are consistent with BD/DNC	
<input type="checkbox"/> Ancillary testing results are <u>not</u> consistent with BD/DNC	
<input type="checkbox"/> Ancillary testing results are inconclusive	
Date/Time of testing	Date of interpretation of results
Attending name, signature, date, time.	

SUMMARY OF FINDINGS	
<input type="checkbox"/>	<p><b>BRAIN DEATH/DEATH BY NEUROLOGIC CRITERIA DETERMINED CLINICALLY</b></p> <ul style="list-style-type: none"> <li>Prerequisites for clinical testing have been fulfilled, (Section II), and</li> <li>Results of clinical exams, including apnea testing, have been fully completed and are consistent with BD/DNC (Section III, IV)</li> </ul> <p>Date (YYYY-MM-DD) and time of death (HR:MM AM/PM):  <i>(Time of death is the time during the final apnea test [if more than one performed] that the ABG results are reported and demonstrate that the PaCO<sub>2</sub> and pH levels are consistent with BD/DNC criteria [36a].)</i></p>
<input type="checkbox"/>	<p><b>BRAIN DEATH/DEATH BY NEUROLOGIC CRITERIA DETERMINED WITH CLINICAL ASSESSMENT AND ANCILLARY TESTING</b></p> <ul style="list-style-type: none"> <li>Results of clinical exams, including apnea testing, where tested are consistent with BD/DNC (Section III, IV), and</li> <li>Ancillary testing has been performed and results are consistent with BD/DNC (Section V)</li> </ul> <p>Date (YYYY-MM-DD) and time of death (HR:MM AM/PM):  <i>(Time of death is the time an attending clinician (e.g., nuclear medicine physician or angiographer) documents in the medical record that the ancillary test results are consistent with BD/DNC [36b].)</i></p>
<input type="checkbox"/>	<p><b>PATIENT DOES NOT MEET CRITERIA FOR BRAIN DEATH/DEATH BY NEUROLOGIC CRITERIA</b></p> <p>Provide reasons:</p>
Attending name, signature, date, time.	