

## Competing Interests

The authors declare no competing interests.

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## References

1. Glance LG, Faden E, Dutton RP, Lustik SJ, Li Y, Eaton MP, Dick AW: Impact of the choice of risk model for identifying low-risk patients using the 2014 American College of Cardiology/American Heart Association Perioperative guidelines. *ANESTHESIOLOGY* 2018; 129:889–900
2. Cohn SL, Fernandez Ros N: Comparison of 4 cardiac risk calculators in predicting postoperative cardiac complications after noncardiac operations. *Am J Cardiol* 2018; 121:125–30

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## Nomenclature for Perioperative Cognitive Disorders: Comment

### To the Editor:

Recently, Evered *et al.*<sup>1</sup> published recommendations for a common nomenclature to describe cognitive change after anesthesia and surgery. We wholeheartedly applaud this effort, which is long overdue, and congratulate Evered *et al.* on the successful completion of this challenging project that tried to achieve consensus among the numerous groups that seek to understand and improve brain health after surgery. While we are in agreement with the vast majority of the recommendations, we believe that use of the term “delayed neurocognitive recovery” to describe cognitive decline in the first 30 days after surgery is not supported by scientific data and is inappropriate.

First, even though we fully agree that cognition is difficult to assess before hospital discharge, as it is often confounded

by pain and medication, the assumption in the recommendations that recovery is complete in all patients only at 30 days and perhaps even definitively complete at 30 days is altogether arbitrary. The time required for complete recovery is highly dependent on the surgical procedure as well as the individual patient, and no studies have established that 30 days is the point at which recovery is universally complete. The fact that 30-day outcomes are commonly used as quality metrics for clinical performance is also irrelevant, as medical diagnoses are evidence-based and are not tethered to timelines for quality assessment. Second, the term “delayed neurocognitive recovery” is not logically coherent. It asserts that all patients will recover, which is certainly not true for postoperative cognitive decline (or neurocognitive disorders), and thus creates false hope for patients, a concern that is as great as the fear of mislabeling patients. Further, there is no such parallel in diagnostic medicine. To our knowledge, nothing in medicine is diagnosed as “delayed recovery.” For example, in cases of reduced kidney function after critical illness, recovery of kidney function is expected and occurs in a significant percentage of the patients<sup>2</sup>; however, the diagnostic term for these patients is “acute kidney injury” and never “delayed kidney recovery.” Finally, we note that while they sought to align with *Diagnostic and Statistical Manual for Mental Disorders, Fifth Edition* (DSM-5) criteria, the authors acknowledged that use of the term “delayed neurocognitive recovery” was the “one departure from DSM-5 nomenclature.”

Without a doubt, additional research is needed to delineate the significance of the cognitive changes seen early after anesthesia and surgery. However, existing data would suggest that the earlier changes seen in a neurocognitive testing battery do correlate with more sensitive markers of brain function. For example, Default Mode Network functional connectivity assessed by magnetic resonance imaging appears to be altered postoperatively in cardiac surgery patients both at rest and during task performance when compared to nonsurgical subjects, and these alterations in brain network connectivity correlate with cognitive change measured by the test battery.<sup>3,4</sup> Further, the change in cognitive score at 6 weeks after surgery is significantly associated with 1-yr activities of daily living and self-reported cognitive difficulties.<sup>5</sup> Thus, we believe it is inappropriate to refer to the early changes detected by a neurocognitive testing battery as simply part of the recovery process.

Once again, we are grateful to the Nomenclature Consensus Working Group for the enormous effort that has gone into creating these recommendations. We wish to reinforce that we are in complete agreement with the group that neurocognitive testing should be conducted with a comprehensive neurocognitive testing battery as opposed to a screening test, and only after the patient has been discharged from the hospital. Nonetheless, we believe that the term “delayed neurocognitive recovery” is fatally flawed

and should be immediately revised as opposed to a promise of a revision in the next version (4 to 5 yr from now). The urgency arises not just from the lack of evidence-based support for the term, but also from the fact that journal reviewers are already requesting that “delayed neurocognitive recovery” be applied, even to studies designed years ago. Unfortunately, it is likely that the National Institutes of Health (Bethesda, Maryland) and other funding agencies will quickly follow suit and potentially consider postoperative neurocognitive disorders as insignificant, since it would merely be a stop on the road to recovery. Moreover, to maintain consistency with the DSM-5 and until new studies dictate otherwise, we recommend that the proposed framework be revised to state that once the patient is discharged from the hospital, the terms “mild or major neurocognitive disorders” should apply. Pain scores and medication use at follow-up could be evaluated as covariates.

### Competing Interests

Dr. Mathew is on the board of MedBlue Data (Durham, North Carolina). Dr. Welsh-Bohmer has contracts with Takeda Pharmaceutical Company (Deerfield, Illinois) and VeraSci (Durham, North Carolina). None of these are competing interests with the contents of this letter.

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### References

1. Evered L, Silbert B, Knopman DS, Scott DA, DeKosky ST, Rasmussen LS, Oh ES, Crosby G, Berger M, Eckenhoof RG; Nomenclature Consensus Working Group: Recommendations for the nomenclature of cognitive change associated with anaesthesia and surgery-2018. *ANESTHESIOLOGY* 2018; 129:872–9
2. Ali T, Khan I, Simpson W, Prescott G, Townend J, Smith W, Macleod A: Incidence and outcomes in acute kidney injury: A comprehensive population-based study. *J Am Soc Nephrol* 2007; 18:1292–8
3. Browndyke JN, Berger M, Harshbarger TB, Smith PJ, White W, Bisanar TL, Alexander JH, Gaca JG, Welsh-Bohmer K, Newman MF, Mathew JP: Resting-state functional connectivity and cognition after major cardiac surgery in older adults without preoperative cognitive impairment: Preliminary findings. *J Am Geriatr Soc* 2017; 65:e6–e12
4. Browndyke JN, Berger M, Smith PJ, Harshbarger TB, Monge ZA, Panchal V, Bisanar TL, Glower DD, Alexander JH, Cabeza R, Welsh-Bohmer K, Newman MF, Mathew JP; Duke Neurologic Outcomes Research Group (NORG): Task-related changes in degree centrality and local coherence of the posterior cingulate cortex after major cardiac surgery in older adults. *Hum Brain Mapp* 2018; 39:985–1003
5. Phillips-Bute B, Mathew JP, Blumenthal JA, Grocott HP, Laskowitz DT, Jones RH, Mark DB, Newman MF: Association of neurocognitive function and quality of life 1 year after coronary artery bypass graft (CABG) surgery. *Psychosom Med* 2006; 68:369–75

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### To the Editor:

*“Anybody can treat, but not anybody can diagnose.”<sup>1</sup>*

In “Recommendations for the Nomenclature of Cognitive Change Associated with Anesthesia and Surgery-2018,” Evered *et al.*<sup>2</sup> fail to acknowledge that perioperative neurocognitive disorder is a diagnosis by exclusion, *i.e.*, “a diagnosis that remains after all other differential possibilities have been excluded.”<sup>1</sup> In reports of perioperative neurocognitive disorder to the present, “differential possibilities” are not excluded. Investigators presume, but do not prove, that patients with perioperative neurocognitive disorder experience declines in tests of psychometric performance after surgery that do not arise from other neurologic and psychiatric diagnoses including stroke, epilepsy, trauma, infection, hydrocephalus, intoxication, psychosis, depression, posttraumatic stress disorder, and other progressive neurocognitive syndromes.<sup>3</sup> These disorders prejudice cognitive test results in the elderly, and may first become manifest to the patient and clinician in the interval between surgery and neuropsychologic test administration 3 and 12 months later. None of the articles cited by the authors in their article or in its supplements that attest to the existence of perioperative neurocognitive disorder report evaluations at scheduled intervals before surgery, and at 3 and 12 months after surgery by specialists credentialed to perform comprehensive neurologic