



## ARTICLE OF THE MONTH

### Cognitive Aids for the Diagnosis and Treatment of Neuroanesthetic Emergencies: Consensus Guidelines on Behalf of the Society for Neuroscience in Anesthesiology and Critical Care (SNACC) Education Committee

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Welcome to the May 2019 SNACC Article of the Month! This month's article introduces evidence-based cognitive aids for the diagnosis and treatment of eleven neuroanesthetic emergencies and outlines the literature supporting the guidelines.

Our commentary is provided by Dr. Teo Dagi, a neurosurgeon and member of the Board of Directors for the Anesthesia Patient Safety Foundation (APSF). He used to be a flight surgeon and served on the faculty of the United States School of Aerospace Medicine and can therefore offer interesting insights into the history of cognitive aids and elaborate on their optimal use. Dr. Teo Dagi, MD, MPH, DMedSc, MBA is very accomplished and all of his achievements cannot be given justice in their entirety here. His contributions span the areas of neurosurgery, medical innovation as well as venture capitalism. He received a DMedSc (honoris causae) from Queen's University Belfast for his contributions to medicine and public service. He is a professor at Harvard Medical School as well as Queen's University Belfast.

As always, we encourage our readers to give us their feedback on SNACC [Twitter](#) feed or on [Facebook](#).

~ Nina Schloemerkerper, MD; Oana Maties, MD; Adrian Pichurko, MD

### Commentary

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There are three components to this excellent article. The first introduces the rationale for cognitive aids – here taking the form of an evidence-based checklist – for use during neuroanesthetic emergencies. The second discusses the ways a checklist of this nature might be designed and used and emphasizes the importance of visual graphic design and logical process in the development of cognitive aids. The third constitutes a synoptic review in text form of the emergencies covered, the treatment protocol recommended and the evidence-based rationale. This represents a massive and an important effort. As a neurosurgeon, I applaud the effort to provide a standardized, comprehensive, comprehensible, evidence-based and disciplined approach.

Cognitive aids in the form of checklists entered medicine from military flight procedures that arose from a catastrophic demonstration flight of the Boeing B-17 Flying Fortress on October 30, 1935. The elevator controls had not been unlocked: the plane crashed. The plane was deemed by many to be “too complicated to fly,” but the pilots insisted it was not. Four checklists were developed, one for each of the four critical phases of flight operations. The B-17 went on to fly over 220,000 successful sorties, becoming one of the most successful heavy aircraft during WW II. The checklist concept was enlarged to many other complex operations.

With that said, a lot has been learned about the use of checklists. The first lesson is that checklists need to be immediately available, obvious, visible and familiar to the entire team involved. Recording a checklist and reading it does not make the most of any checklist. It has to be intimately familiar. Second, the checklist must be used as a tool and not just an aide-memoire. The checklist must be followed and the designated steps acknowledged and confirmed as part of the use protocol. Third, the checklist must be recited or spoken in full, both when practiced and when used. Even though the team will doubtless know the steps prescribed, the checklist only works as designed when the steps required are communicated verbally and clearly. While there are some trainers who recommend that the checklist be committed to memory, memorization does not seem to add to its benefit. Even if memorized, the checklist must be recited from its text. Fourth, the checklist and the roles and actions required by the checklist must be practiced by the people on the team. Practice involves not only implementing the interventions necessitated by the emergency, but also using the checklist to direct the implementation. The checklist is not intended to teach something new, but to assure that a series of known, designated actions are implemented correctly. It may be useful, during practice, for team members to exchange roles so each develops an understanding of what others may hear and may be called upon to do. Finally, checklists are always subject to refinement and update in view of new evidence and in response to local needs, practices and resources.

There are two other components to the successful management of neuroanesthetic emergencies to which the checklist can contribute. The first is an after action 360° analysis of the events that transpired and the emergency response. Both the term and the idea of a 360° analysis have been overused. Nevertheless, even at the risk of restating the obvious, it is important to consider whether there were any predictive events, or premonitory signals that could have been mitigated to avoid the emergency. The second is whether the checklist was used properly and whether it served its purpose.

It will be important to document differences in outcome with the adoption of checklists, and to study not only their content, but also how their use can be improved.